MARCH 1941 Thirty-Five Cents Per Copy

Coal Age

Volume 46 Number 3

Machine Loading of a heavy parting and gobbing it, in addition to coal loading, makes up the operating cycle of track-mounted units at Sayreton No. 2 mine of Republic Steel Corporation. Details of mechanical mining work are given in chart, picture and story, p. 39. . . **A 1350-hp. d.c. motor** is a pretty big unit and hard to cool, especially at the slow motor speed of 55 r.p.m. and hoisting 1,000 tons of coal per hour from a depth of 600 ft., but forced ventilation was the right answer. Fred W. Richart will peg the details in a well-illustrated article to be published soon in *Coal Age*. . . . **Loading-machine lubrication** is a bothersome problem in most highly mechanized properties. But it's been licked at Kings mine, Princeton, Ind., where greasing machines provide a clean, metered delivery and a simple report system provides a continuous check on conditions. Master Mechanic James Guiney

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FOR THE MINING INDUSTRY

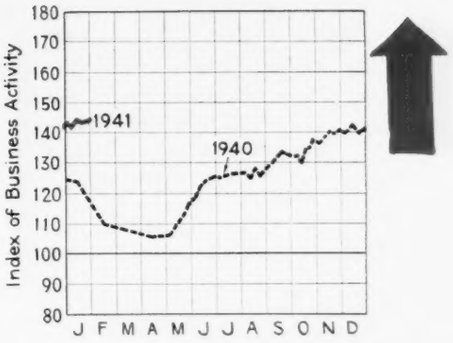
(CONTINUED FROM PAGE 5)

and Ivan Given have written all about it, p. 51. . . . **Larger mine cars** to give a proportionate decrease in changing time behind mechanical loaders have promoted many theoretical discussions. However, at Princeton Mining Co. larger cars have proved that theoretical benefits can be obtained in actual practice. Serving four production and one development machine, the first big-car installation upped loader output 20 per cent. Ivan Given gives readers the result of it all in an early issue of *Coal Age*. . . . **How drawslate is held** and operating costs are reduced with conveyor loading in the Pittsburgh seam at Jefferson Coal & Coke Co., Avella, Pa., is told by Superintendent Claude Ferguson, p. 51. Systematic timbering, coordination and cooperation of face crews account for the successful loading cycle—and a cleaner product goes to market. . . . **Men, Management and Machines** will constitute the editorial theme of *Coal Age*'s April Pre-Convention Issue. The importance of co-ordinating coal's three major forces for national defense—and afterward to be economically prepared for the post-war period—is paramount. Where and how attack on the problem can give greater efficiency, what is being done on the man-power problem, and what needs to be done will be developed in this forthcoming issue of *Coal Age*.

HOW'S BUSINESS

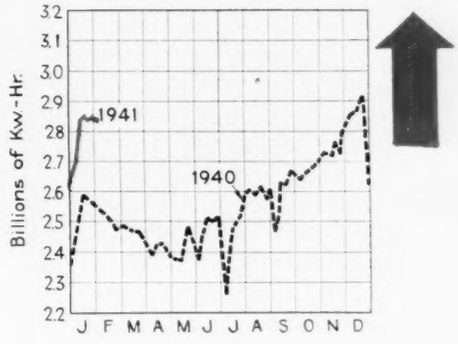
GENERAL BUSINESS CONDITIONS

Though the *Business Week* Index was at 144.3 on Feb. 8, compared with 142.7 on Jan. 18; 145, Jan. 25; and 144, Feb. 1, "defeat scare" selling may be a menace this spring if the expected attack by Germany should materialize. Regardless of its outcome, however, the American defense program will proceed —possibly at accelerated tempo—with a high level of industrial activity assured.



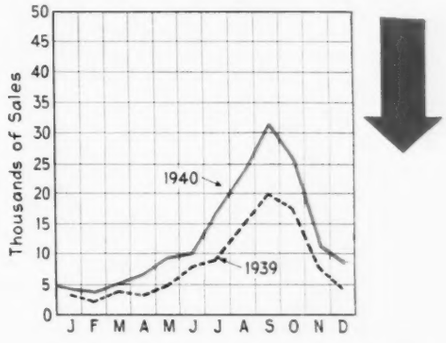
ELECTRICAL POWER OUTPUT

Output of electric energy by the electric light and power industry, according to the Edison Electric Institute, showed a widened gain to 11.9 per cent during the week ended on Feb. 8 over the corresponding week a year ago. Production figures for recent weeks are: Jan. 18, 2,844,000,000 kw.hr.; Jan. 25, 2,830,000,000 kw.-hr.; Feb. 1, 2,830,000,000 kw.-hr.; Feb. 8, 2,823,651,000 kw.-hr.



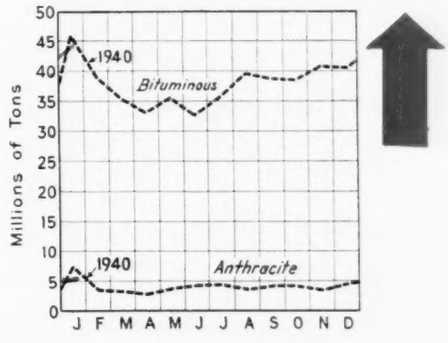
COAL STOKER SALES

Mechanical stoker sales in the United States in December last totaled 6,357 units (U. S. Bureau of the Census from 107 manufacturers), compared with 10,845 in the preceding month and 4,969 in December, 1939. Sales of small units in December last were: Class 1 (under 61 lb. of coal per hour), 5,320 (bituminous, 4,649; anthracite, 671); Class 2 (61-100 lb. per hour), 414 (bituminous, 389; anthracite, 25); Class 3 (101-300 lb. per hour), 369.



COAL PRODUCTION

Bituminous coal produced by United States mines in January last (preliminary) totaled 43,905,000 net tons, according to the Bituminous Coal Division, U. S. Department of the Interior, which compares with 41,400,000 tons (revised) in the preceding month and 44,976,000 tons in January, 1940. Anthracite tonnage in January last (preliminary) was 4,975,000, according to the U. S. Bureau of Mines, against 4,699,000 (revised) in the preceding month and 5,622,000 in January, 1940.



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Coal Age

Established 1911 — McGraw-Hill Publishing Co., Inc.
SYDNEY A. HALE, Editor • MARCH 1941

Pertinent and Impertinent

• ORGANIZED LABOR, particularly the C.I.O. wing, is out to compel industry to give the worker greater voice and power in the councils of management. Multiplying strikes in plants engaged on national-defense contracts, however, hardly seem an appropriate setting for inaugurating such a movement.

• REARMAMENT for national defense is now the No. 1 job of the country. The job will take billions of dollars. Coal producers can make an unusually effective contribution to its success with low-cost tonnage. And where can the individual operator better study how to lower costs than at the Cincinnati Coal Convention and Exposition of the American Mining Congress? There he can see the newest in cost-cutting equipment; there he can exchange experiences with brother producers. Remember the dates: April 28 to May 2.

• MINE WORKERS in Alberta and British Columbia will receive a bonus of 18 cents per day the first four months of 1941. This award is made under a war-time wage contract which provides that, whenever living costs rise 5 per cent above the 1938 base, a bonus equal to that increase will be paid all workers (*Coal Age*, November, 1940, p. 31). The independent commission set up by this agreement between the western Canadian operators and the United Mine Workers found that the cost of living had increased 7.5 per cent. Is this plan for meeting the uncertainties of an emergency situation too simple for consideration south of the international boundary line?

• WHAT DETERMINATION—and hard work—can do to improve safety records is vividly shown by the Pittsburgh Coal Co. In 1936, it mined 13,821 tons per compensable accident, registered a modest gain the following year, and climbed to 20,363 tons in 1938. This figure was raised to 32,648 tons in 1939. Last year it jumped to 54,827 tons, with the average for the final quarter 82,217 tons!

• A STREAMLINED VERSION of the prodigal son's return is the latest proposal for ending bootleg anthracite mining. This plan calls for the employment of the bootleg miners by legitimate operators. Producers swelling their total number of workers by such additions would be permitted to increase their quotas under the allocation program 3¼ tons per day for each bootleg miner employed. Jobs would be open only to men "who have a family background of employment or previous employment in the legitimate industry." This would eliminate many of the owners of bootleg breakers, who would squawk loudly at the destruction of their racket. That, however, is something for the Commonwealth of Pennsylvania to worry about.

• HAS COAL an advertising story for the public at large? Most bituminous executives who heard the presentation sponsored by the National Coal Association in recent

weeks seemed to think so. But the number actually pledging financial support is still far short of the number necessary to put the campaign over. Why? Is it disagreement with details of the program? These can be ironed out. Or is it just another case of "let George do it" and ride on his coat tails? George can't fight everybody's battles and win single-handed—not with coal's competitors presenting a united front.

Smoke Abatement

DUST-POLLUTED atmospheres are ranked high in the list of public-health enemies these days. Although smoke is not the only source of air defilement, it is the most vulnerable to attack. That means that any smoke-abatement campaign puts the coal industry under fire. Last year, St. Louis was the storm center; this year, Pittsburgh has that unenviable distinction. But Cleveland and Columbus also are pressing for action and the battle is winning recruits in still smaller communities.

The pure-air movement cannot be wished out of existence. Blind opposition will only strengthen it and encourage its more starry-eyed partisans to go to excess. Active participation is the better way. Since the coal industry has most at stake, public-spirited coal men should take the leadership in the campaign. In that way, working with and through other civic groups, as was done in Chicago several years ago, objectives that are not more injurious to the community than the benefits they confer may be attained.

Self-Government

UNDER existing circumstances, a two-year extension of the Guffey-Vinson act appears not only expedient but desirable. Sentiment among bituminous-mine executives, as revealed in the recent *Coal Age* poll on the issue (February, 1941, p. 49), runs strongly in favor of such an extension. In view of the admitted imperfections of the statute, this majority vote may be taken as a recognition of present exigencies and a tribute to the administration of the law by the Bituminous Coal Division.

How far such regulation in the future will curtail self-government by the industry, for the moment at least, would seem to rest largely with the industry itself. The framework of the act gives wide powers to district boards of the operators' own choosing. Exercise of these powers is encouraged by the administration. But, if the industry abandons the initiative and insists on running to Washington for decision on every move it makes, it invites detailed, straitjacket control. That was the mistake the railroads made many years ago.

Too Good

WHEN the rearmament program started, the coal industry assured Uncle Sam of its readiness to take on any additional load which national-defense requirements might impose upon it. And meant it. So far, performance has not belied that assurance. Manufacturers turning out war materiel have been able to secure the coals they want. Nobody in essential industry has been complaining to Washington and nobody in the official defense administration is worrying about coal.

This complacence, for which the coal-mining industry is itself in part to blame, may prove both costly and dangerous. Certainly it cannot be supported by critical analysis. For one thing, to date only the captive mines of the steel industry have felt any measurable impact of increasing demands attributable to the national-defense program. Many commercial mines serving important industrial centers actually mined less coal the first few weeks of 1941 than they did a year ago.

Meeting the inevitable increased demands for coal when defense orders are more widely scattered and production passes more from raw materials to fabrication will require adequate equipment and trained personnel. It is here that too easy confidence in the ability of the mines to function efficiently under any conditions can do the greatest damage. Complaints of delayed deliveries of mine equipment and supplies already are heard. Instances also are reported where deferred classification under the draft has been denied to key men.

Today such still sporadic handicaps to mine operations may seem inconsequential. But they are creating conditions not easily remedied if and when the defense program makes quick deliveries of fuel imperative. Men for supervisory positions in coal mining cannot be trained overnight. Mining machines cannot be fabricated in a few hours—especially if the manufacturer must wait months for raw materials and a large part of his plant facilities and personnel have been commandeered to produce armored tanks or gun carriages.

Because coal has been no problem to defense officials is no guarantee that it cannot become critical in the future. Now is not too soon to lay plans to avoid that development. Otherwise the nation may wake up to find that coal's present performance has been too good. Too good because it has made Washington neglect to take the steps necessary to keep future performance on the same level.

How's Equipment?

DURING the first stages of the depression starting in 1929, most industries tried hard to check the speed of decline and to cushion the bumps. But not in 1937-38. That descent was a nose dive with few parachutes working. Every expenditure that could be cut was chopped to the bone—and some managements didn't spare the bones. As a result, not a few mining companies put major maintenance and repairs on the deferred list.

Rising demand for coal and increasing delays in deliveries of equipment and supplies are on the horizon. Is present equipment in condition to stand more continuous operation without costly breakdowns? Have future requirements for machines and supplies been far enough anticipated to forestall profit-killing delays? These questions concern every coal-mine executive. Time is not standing still.

LOADING MACHINES

Remove and Gob Middleman In Selective Mining at Alabama Operation

Removing and gobbing the heavy middleman at Sayreton No. 2 mine is handled by the same high-turntable track-mounted machines that load the coal. The cut is made over the middleman, the top bench is loaded, and the middleman is ripped out by the loader and gobbed behind a plank fence. "Pushing-out" pillars with loading machines by slabbing them from the inside out toward the gob is another feature of Sayreton mechanical mining work.

By IVAN A. GIVEN
Associate Editor, Coal Age

A SELECTIVE mining system under which loading machines are employed to remove and gob a heavy parting, or "middleman," is a major feature of mechanization of loading at Sayreton No. 2 mine, Republic Steel Corporation, Sayreton, Ala. The first loading machine was installed in April, 1939, and was started on a double-shift schedule June 11. The second was installed Aug. 1, with double-shifting following on Aug. 9. By 1941, with the delivery of the third and fourth of a total of four machines, the entire output of the property, aggregating some 1,800 to 2,000 tons per day (eight machine shifts), will be produced mechanically. Eventually the system developed at No. 2 will be applied at the neighboring Sayreton No. 1 mine as far as numerous faults ranging in throw from 0 to 100 ft. will permit.

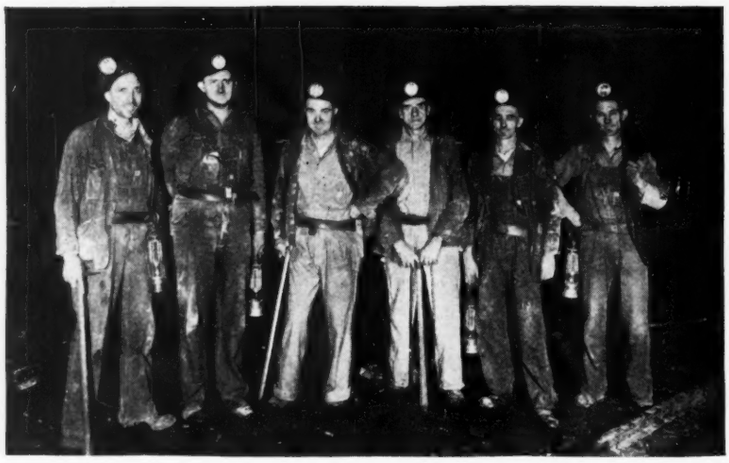
Sayreton No. 2 was opened in 1926 and until two years ago was operated on a hand-loading mule-haulage basis. Replacement of mules by locomotives started in 1938. To get the maximum benefit from the new loading equipment, the company went to hydraulically controlled track-mounted cutting equipment, also an aid to selective mining, and replaced its old 2½-ton wood cars with 5-ton all-steel units.

The Sayreton No. 2 acreage is bounded on two sides by faults with maximum throws of approximately 100 ft. on the east and 80 ft. on the west. The mine has been developed downward from the outcrop on the south, where the pitch was a maximum of 26 per cent, and present workings are in the bottom of the basin. Thus, the coal lies nearly level, except for local hills and swags, under an average of 500 ft. of cover. When the loading machines were first installed, however, they were used in areas where the pitch was as high as 10 per cent without undue difficulty.

In view of prevailing conditions, it was natural that Sayreton No. 2 be opened by a slope now some 7,000 ft. long. Most of the coal in the future, however, will come off a new "inside slope" 1,600 ft. east of the main opening. Although termed a slope, the new opening is practically level, and a main-line locomotive will pull up this slope (Fig. 1) and across 7th Right entry to the main slope. The latter, as might be expected from the fact that it was driven directly down the dip, has a pitch of 26 per cent at the top, flattening out to nearly zero at the bottom. This flattening tendency was one of the main reasons for conducting slope haulage in two stages, inasmuch as, with one hoist on the surface, rope drag was so great that when empty trips neared the extreme bottom the cars could not be spotted at the desired point. Hoisting in two stages also increased net slope capacity.

Slope trips at present comprise six cars, each car weighing approximately 3,800 lb. and holding 9,800 lb. of coal, making the total trip weight approximately 41 tons. Maximum hoisting capacity is seven trips per hour, while the normal operating rate is slightly over six. The bottom stage of the hoisting cycle is handled by a single-drum hoist driven by a 150-hp. slip-ring motor. This hoist is equipped with 3,600 ft. of rope. The surface hoist, with 3,300 ft. of rope, is a single-drum machine driven by a 600-hp. slip-ring motor. Both motors are 2,300-volt units.

Three headings make up the main slope, with the center for haulage. Two rooms on each side are kept open as auxiliary airways, thus making a total of seven openings for air and haulage. The main slope proper is protected by 200-ft. pillars between the auxiliary airways and the slope headings. Other slopes, also with the auxiliary airways, are protected by 125-ft. barriers. Air is circulated by a 10x4-ft. centrifugal fan with counterweighted explosion doors operating exhausting. The main drive is a 75-hp. slip-ring motor with a 125-hp. gasoline engine as an auxiliary. With the 75-hp. motor, the fan circulates



Lined up for their pictures are, left to right: Charles Justice, section foreman; W. J. Bailey, assistant superintendent; H. M. Johnstone, superintendent; W. M. Goodwin, safety inspector; George Ferguson, mine foreman; W. W. Hayes, shotfirer.

approximately 127,000 c.f.m. at a water gage of about 2.1 in.

Thickness of the Mary Lee seam recovered ranges from 6 to 9 ft., with the average about 7. This total includes the middleman and an accompanying bony band separated from it by a thin layer of coal, the whole varying from 17 to 23 in. and averaging about 19.2 in. in thickness, in addition to other thinner partings and bands in both the top and bottom benches. Typical sections in the working territories at the time this article was prepared are shown in Fig. 2.

The seam at Sayreton No. 2 is underlain by a foot of hard fireclay, under which is 6 to 10 in. of coal resting on a hard shale. Consequently, when weight comes on, the props tend to go into the bottom, which also is inclined to heave. The usual top is sandstone, although in some cases the coal is overlain by slate, shale or, in a few instances, a thin drawrock, followed by the usual sandstone. Slips occasionally are encountered, while kettle bottoms are numerous. Ordinarily, the top is held in place.

The Newcastle seam is present some 40 ft. above the Mary Lee. In addition to the sandstone and slate, the interval usually includes shale. Because the strata tend to separate easily at the Newcastle seam, open-ending of pillars, pocketing and leaving small stumps or fenders against the gob and similar pillar-extraction methods were considered impracticable because the weight of the 40-ft. interval is too great for props, small stumps, fenders, etc., thus increasing the risk of falls with consequent loss of places and possibility of personal injuries. Therefore, pillars are removed by slabbing them on two sides, starting on the inside and working out to the gob.

Production equipment at Sayreton No. 2, where the official staff includes H. M. Johnstone, superintendent (both No. 2 and No. 1 mines); W. J. Bailey, assistant superintendent; George Ferguson and Mike Loebler, mine foremen; H. T. Payne, chief electrician; W. E. Whitten, master mechanic; W. M. Goodwin, safety inspector; W. O. Hodgkin, mining engineer; and R. W. Perry, assistant mining engineer, who prepared the special drawings used in this article, consists of high-turntable track-mounted loading machines, track-mounted cutting machines with 9-ft. thin (3½-in.) kerf bars, hand-held electric coal drills fitted with self-cleaning augers and

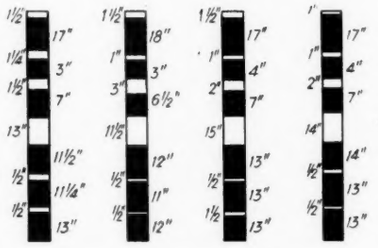


Fig. 2—Typical sections of the Mary Lee seam, Sayreton No. 2 mine, showing middleman overlain by thin layer of coal in which cutting is done.

4-ton cable-reel locomotives, one per loading machine, in addition to the new cars and other auxiliaries, including one 8-ton main-line locomotive.

The new cars, 180 in number, are rated at 144 cu.ft. level full. Capacity, mechanically loaded, is 4.9 tons. The cars, with wood bumper inserts, single-link drop-forged couplings, 3-in.-diameter axles and 16-in. cast-iron wheels with roller bearings, are fabricated of Republic double-strength "R.D.S." copper-bearing acid- and abrasion-resisting chrome steel. Inside dimensions are 9 ft. 8 in. x 5 ft. 8½ in. Length over the bumpers is 10 ft. 3 in. Height over the rails is 43 in. Installation of these cars alone is credited with an increase of 500 tons in daily output due to their increased capacity and their greatly reduced liability to derailments, breakage of links and drawbars on the slope, and other troubles.

One cutting machine and crew at

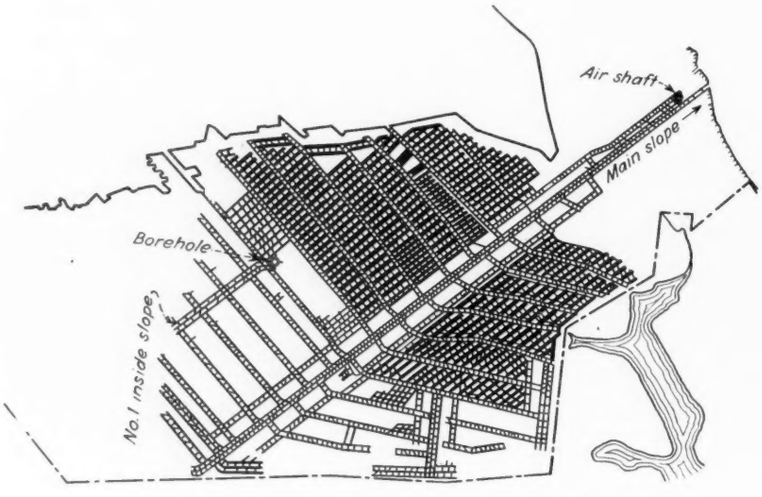
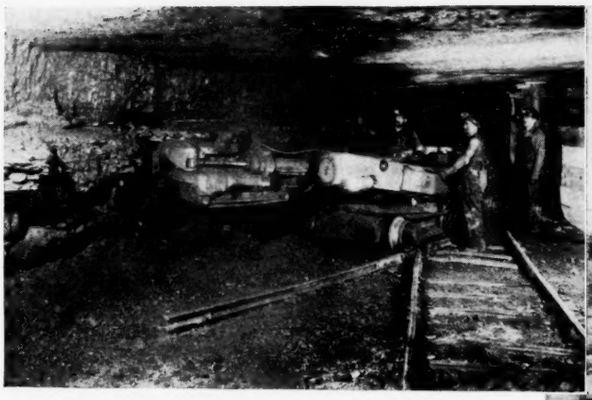
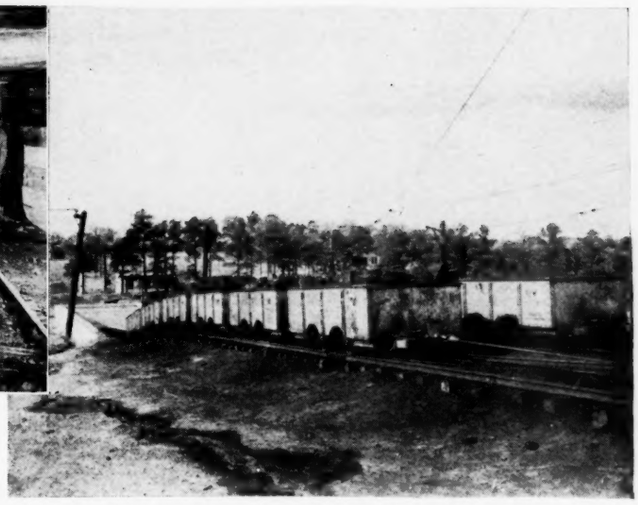


Fig. 1—Sayreton No. 2 mine, showing general plan of development.



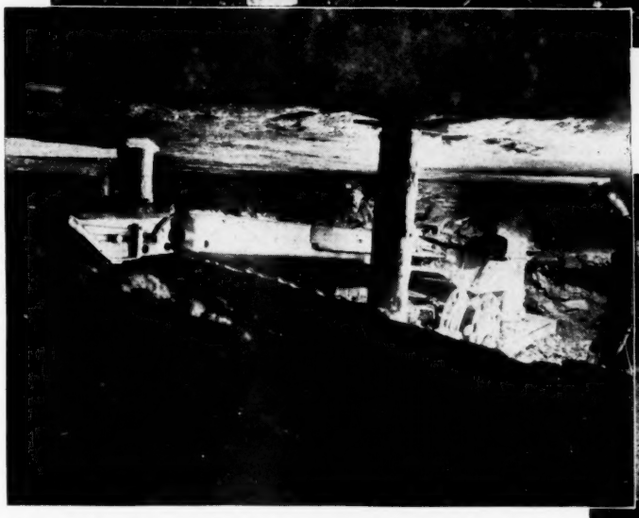
Showing the cutting machine sumped over the middleman in a crosscut. The thin cut is made just under a bony band a short distance above the middleman.



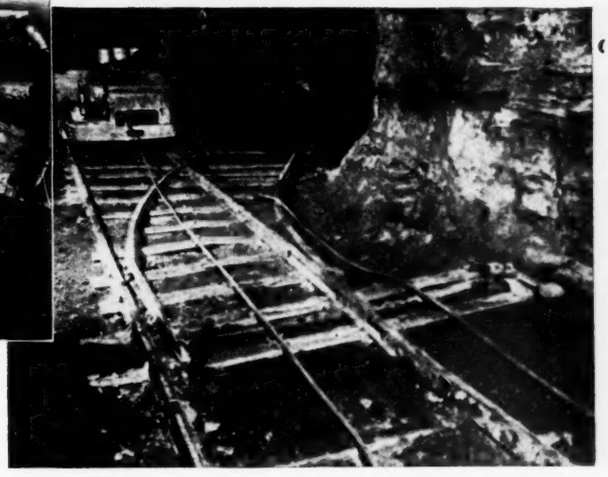
Top of the slope at Sayreton No. 2, showing trip of new cars on the way out.

Loading the top bench in the first slabbing cut on a pillar. When the coal is taken out, the head of the loading machine will be dropped and the middleman ripped out and gobbed at the right.

40-lb. rail steel ties and sectionalized-steel-tie turnouts facilitate tracklaying in working territories. Regular track cleaners are responsible for the absence of loose coal.



Here the loading machine is shown gobbing the middleman from a crosscut in solid work. The loading head in the background rests on the bottom bench of coal.



Sayreton No. 2 normally cuts and drills for two loading machines. On this basis, the standard crew, excluding mainline haulage, aggregates twelve men, as follows: loader operator and helper, motorman and coupler, trackman and helper, timberman and helper, rockman and helper, one-half a shotfirer, one-half a cutting and drilling crew (one man), and one-half a section foreman. With rock handled averaging about ½ ton per ton of coal produced, crews of about this size (10 to 13 men) were averaging 200 tons per shift at the time this article was prepared. As more experience is gained and additional loaders are installed, the average is expected to rise to 225 to 250 tons per shift.

Work on 60-Deg. Angle

The working plan at Sayreton No. 2 provides for driving panel entries to the right or left of the slopes as shown in Fig. 1. Such entries consist of two headings 20 ft. wide on 50-ft. centers. The 20-ft. heading width permits gobbing the middleman. Panel entries are spaced to provide for rooms 300 ft. deep, rib to rib of entries. Rooms and crosscuts are turned on a 60-deg. angle to ease haulage and facilitate loading in turning new places, crosscuts, etc., and the centers, measured along the entry, are 73½ ft. With crosscuts on 72½- and 73-ft. centers, mostly the latter, and with rooms and crosscuts driven 16 ft. wide, 54½x55-ft. diamond-shaped pillars are formed. The present pillars are approximately 10 ft. longer per side than those worked earlier, the larger-sized units providing more coal per slab and also a larger percentage of pillar coal per foot of room driven.

Panel entries are driven to the boundary or other limit before room and pillar work is started. Thus, full-retreat operation is the rule in a panel, with pillar lines continuous from one panel to the next on a 45-deg. angle. Normally, when retreat is fully established, a panel territory will consist of one chain pillar, five diamond-shaped room pillars and five to seven rooms. In other words, rooms, as indicated in Fig. 3, are driven only as needed. One loading machine is assigned to one panel, with a cutting machine shuttling back and forth between two adjacent panels. In driving rooms, which are started full width, the track is laid on either the right or left side, depending upon which way the entry is turned. This permits gobbing the middleman and other rock on one side of the place.

The system used in mining individual room pillars is shown generally in Figs. 3 and 4 and in detail in Fig. 5. It is based on slabbing two sides, working from the room and last crosscut toward the gob. At the time the first slabs are cut, small stumps on three corners are made by putting in vertical shear cuts. The one stump at the starting corner is left as long as it does not interfere with shifting track and other operations, while the stumps on the other corners normally stand until operations on the pillar are completed.

After the first slabbing and shearing cuts are made, the pillar is removed by cutting and loading successive slabs, swinging the two tracks over each time as required, until two-thirds to three-fourths has been removed. When this stage is reached, the increased weight on the remaining coal makes it unnecessary to cut or shoot, and the last of the pillar is "pushed out" by the loading machine alone, working from the more convenient of the two tracks. As all the pillars are started and finished simultaneously, a fall normally is made the full length of the line. In future operation, however, it is expected that lines will be stepped from panel to panel to prevent caving an unduly large area at one time. When the time comes for a fall, the mined-out area first is rock-dusted and breaker posts are set as indicated in Fig. 5. Then the stumps, if still standing, are shot out and the props removed as far as possible.

Chain Pillars Slabbed

Chain pillars are recovered by first skipping up the aircourse side from the nearest crossover. Skipping, by taking successive short cuts, is done at this stage to facilitate working and gobbing of the middleman in the close quarters normally encountered in these openings. After skipping is completed, the chain pillars are mined by slabbing, the same as room pillars, the work being scheduled to keep chain-pillar removal on line with room-pillar extraction.

When the loading machine at Sayreton No. 2 has completed its work

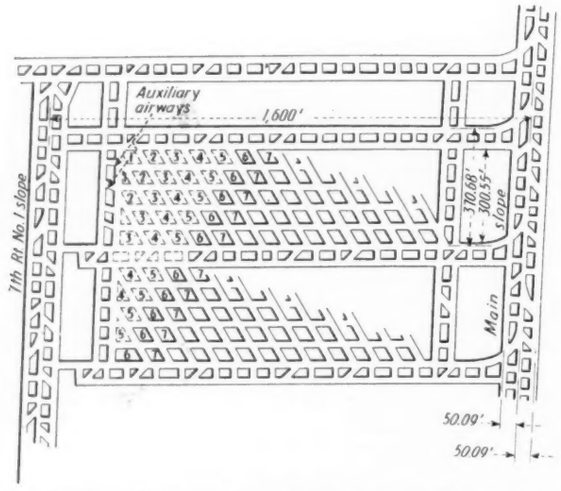
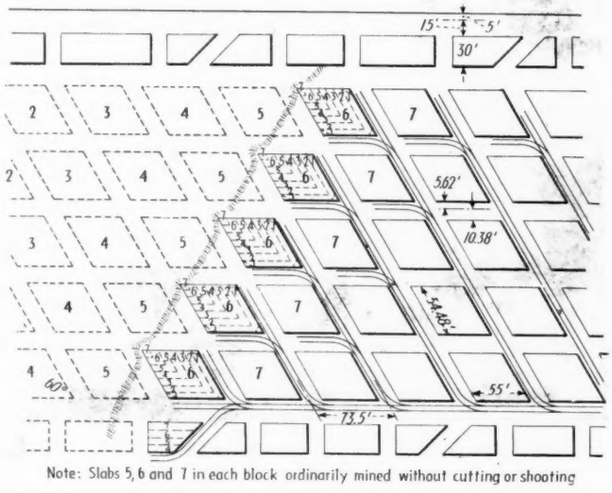


Fig. 3—How pillars are drawn and new rooms driven to keep up the supply of working places at Sayreton.



Note: Slabs 5, 6 and 7 in each block ordinarily mined without cutting or shooting

Fig. 4—Enlarged section of a working territory showing how pillars are mined by slabbing them from inside.

in a place it is followed by a crew of track cleaners (two men) who shovel up all loose coal in the place, square up the face, and otherwise clean up and prepare the place for cutting and subsequent operations. It should be emphasized that a major duty of this crew is to keep the place clean from heading to face. The track cleaners are followed by the trackmen and timbermen. In solid work, the principal duty of the timbermen is to extend and build up the fence behind which the middleman is gobbed. The support for the fence is two lines of posts, one line against the rib on one side of the place and the other about 6 ft. out. Posts are set on 8-ft. centers to permit their incorporation into gobbing bays in subsequent pillar mining.

Fences Used for Gobbing

In the normal 16-ft.-wide place, setting the two rows of posts as outlined above leaves a clear opening of 10 ft. for the track, which assures the minimum clearance of 30 in. on each side of the rail specified by the company for safety and ease of movement of both men and equipment. Pairs of posts are tied together at the top and bottom by narrow slats. Planks then are nailed to the outside row of posts to make the gob-retaining fence (Fig. 5). Thus, to gob the middleman in solid work, all that is necessary to do is to swing the rear conveyor of the loading machine over the top of the plank fence and let go. Gobbing the middleman inside naturally is cheaper than loading it and hauling it out, and after investigation it was evident that the plank fence was a cheaper and more convenient system of maintaining clearance and providing storage space than building rock walls by hand. Planks and other timber are recovered for re-use as the pillars are brought back.

The fences normally, however, stay in place until the first slab has been taken off a pillar and additional gobbing room is available. In fact, gobbing at this stage is more difficult than any other because of limited disposal space. However, by stacking it up behind the fence as far as possible, plus some tramming to fill up all available areas, it can be done without loading any of it out. After the first cut, however, the plank fence is removed and the gobbing bays are started by extending timber rows

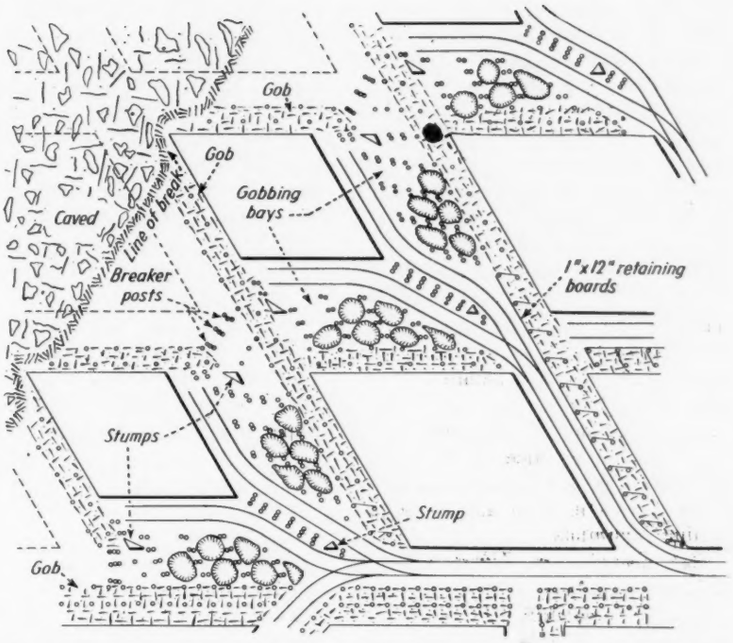


Fig. 5—Showing use of gobbing bays in "pushing-out" pillars in Sayreton No. 2 mine.

across the original room or crosscut about as indicated in Fig. 5. As the rows are extensions of the original timbers, set on 8-ft. centers, gobbing bays of that width are formed. Thus, to dispose of the middleman, the rear conveyor of the loading machine is turned into the most convenient of the several bays.

Rock-dusting follows cleaning up, track extension or change, and timbering at Sayreton No. 2, the practice being to rock-dust by hand each time a place advances a cut, supplementing this by other dusting as required. Cutting and drilling follow rock-dusting. One crew, as previously noted, does this work for two loading machines, the cutter, which is accompanied by the drill, moving from one territory to the other. Cutter bars on all machines are fitted with water sprays to keep down dust.

The cut at Sayreton No. 2 is made between the middleman and the bony band lying just above it. As this was the logical place to cut, even though the interval was small, the 3½-in.-kerf bar accordingly was adopted, because it permitted both cutting in coal and on top of the middleman. No shearing is done, except in making the stumps at the corners of the pillars as described above.

Drilling is the next step. In solid work, both the top and bottom benches are drilled. In the initial cuts in removing pillars, the top bench usually falls after cutting and need not be shot. And, finally, increasing weight makes it unnecessary to either cut or shoot in recovering the last third or quarter of a pillar. Six holes, three in top and three in the lower bench, are used in shooting a 16-ft.-wide solid place. The explosive is 1¼x8-in. permissible running about 165 sticks per 50-lb. box and holes are tamped solid to the collar with rock dust. Usual loading is one stick per hole in the top bench, with two sticks in the rib holes where tight corners, such as when turning new places and the like, are encountered. Three sticks generally are loaded in the bottom rib holes, with two in the center.

Four Holes in Bench

In pillar work, a 50-ft.-long bottom bench usually is shot with about four holes, with the number proportionately decreased for shorter slabs. Top holes, in all cases, are angled up to the roof, with bottom holes down to the bottom, the latter being especially important to get through a soft streak just above the floor and thus insure separation of the coal from the fireclay. It should be noted, as will be described below, that the bottom bench is not shot until the top and middleman are removed.

The first step in loading is to raise

the front end of the machine and take off the top bench. When this is cleaned off, the head is dropped slightly and the middleman ripped out and gobbed. Ordinarily, the middleman can be entirely removed in this fashion. Occasionally, however, particularly on turns, it is difficult to get all the middleman, so the practice then is to shoot the bottom bench anyhow, which also breaks up the remaining middleman and makes it possible for the loading machine, when it returns to the place, to finish the gobbing operation before proceeding to load the bottom bench. Each loading machine is equipped with a hose and the practice is to sprinkle the coal before loading starts and continue wetting it down all during the loading operation.

Car changing at Sayreton No. 2 follows accepted principles, the 4-ton locomotives switching the loads into the nearest available track. Working sections are laid with 40-lb. rail on West Virginia steel ties with West Virginia sectionalized steel-tie turnouts, complete with throws, which are assembled by bolting the sections together. Main-line haulage to the slope is handled by an 8-ton locomotive. From the top of the slope a 17-ton locomotive moves twelve-car trips 1¾ miles to the preparation plant at Sayreton No. 1 mine. The outside haul is to be rebuilt with 80-lb. steel on creosoted ties with slag ballast.

Production equipment at Sayreton No. 2 is supplied with 275-volt d.c. power by a 150-kw. m.g. set at the slope mouth plus a second 200-kw. set at a borehole near the top of the No. 1 inside slope. The 150-kw. set was original equipment and now serves primarily the outside haulage locomotive, although it can be used to help out underground if desired. Most of the power for face operations, however, comes from the 200-kw. set, which was installed when locomotives replaced mule haulage. It is set over a 580-ft. borehole, and receives 6,600-volt a.c. power from the Thomas power plant, which is reduced to 2,300 volts to operate the synchronous motor on the m.g. set. D.c. is taken underground by means of a 2,000,000-circ.mil rubber-covered cable. The return is a 2,000,000 weatherproof cable. Underground distribution is partly by rubber-covered cable, with the rest by trolley wire and base feeder.

A third 200- or 300-kw. synchronous set will be installed before additional loading machines are started. The present 200-kw. set is equipped with a full-automatic board with provisions for starting and stopping the set from inside the mine or at the Thomas power plant, as well as within the station itself. A similar control system will accompany the new unit when installed.

BETTER AIRWAYS AND FANS

Afford an Approach to Lower Cost And Assure Safety to Life and Investment*

By J. H. DICKERSON
Mining Engineer
New Philadelphia, Ohio

EACH DAY, most mines handle a greater weight of air than of coal, hence their ventilation equipment should be rugged, dependable and efficient. Rarely at any mine is more air provided than is necessary, but, nevertheless, less air usually would suffice if only it were better conserved and distributed.

Mine ventilation deserves more attention than it has been getting, for its power cost usually is a big item, and on ventilation depends the safety, health, and efficiency of mine labor, as also the prospect of an operating profit and the safety of the capital which has been expended in mine development. Insufficient ventilation caused by inadequate or inefficient fans and by unfavorable mine conditions often reduces labor efficiency and subjects a mine to the risk of a dust or gas explosion.

Many coal operators regard ventilation merely as an expenditure and not as a profitable investment, and so think it necessary to supply only as much air as the miners and the State mine inspectors demand. In most cases, by planning, installing and maintaining an efficient system, the cost of power, labor and material to provide an adequate supply of air would be less than for poor ventilation. The reconstruction usually will involve a more efficient fan and some changes in the mine itself.

Sufficient air to remove powder smoke and mine-originating gases should be furnished to the men at the working face. Pennsylvania bituminous mining laws require not less than 150 cu.ft. per minute for each man in the mine, and limit the number of men on a split to 65. With 60 men, the minimum volume, where the air in the split begins its return, would be 9,000

*Second of a series of articles on ventilation. The first appeared in January, p. 44.

c.f.m. Though, with any good system of ventilation, as many as 60 men are not likely to be working in a single split, and though all States do not require as much air per man as Pennsylvania, 9,000 c.f.m. usually is desirable or essential. Where the area of the heading carrying that air is 75 sq.ft., this will give a velocity of only 2 ft. per second, or 1.36 miles per hour. Sailors term any wind less than 2 miles per hour a "calm," according to Beaufort's recognized scale of winds.

Lowest Speed in Gas

For a gassy mine, the speed of the current should not fall below 3 or 4 ft. per second, or about 200 f.p.m. A lower velocity will not remove the light gases from workings to the rise, and it may leave pockets of gas which will ignite, or at least threaten ignition. Where there are dips, unless the air has a speed of 3 or 4 ft. per second, the heavier gases will not be dislodged and brought out. The weakness of a slow current is manifested when it loses directive controls such as brattices to keep it traveling in a certain definite direction. Having no speed, it does not continue in a straight line beyond such controls but travels back direct in obedience to differences of pressure. A strong current, whether from auxiliary or main fan, and traveling in a certain direction, will continue some distance on its own inertia and thus will scour the face.

Mines are likely to have objectionable quantities of carbon dioxide, carbon monoxide, stinkdamp, and other gases. Carbon dioxide in the air even in small quantities will necessitate heavier breathing and cause headache and other ailments; in large quantities it will cause death by suffocation. Even in small quantities, carbon monoxide and hydric sulphide are poisonous. Men sweat excessively when working where the air does not travel, and the carbon dioxide which stagnant air contains may cause nausea.

Air must move at least 30 f.p.m. or powder smoke will settle slowly and not be removed. A man of average size consumes over ten times as much oxygen when walking five miles an hour as when resting in bed; also he exhales about twelve times as much carbon dioxide. In walking rapidly or doing heavy work a man will be affected adversely by a deficiency of oxygen, whereas a man at rest or walking slowly would barely notice that the air is not normal.

British mine-ventilation laws are more strict than those in the United States. Air in the British mines must contain at least 19 per cent oxygen (of which gas there is 20.9 per cent in normal air) and not over 1¼ per cent of carbon dioxide. This applies to all shafts, roads, airways and working places, which must be in a fit condition for men to work in them and pass through them, and an airway is not considered free of flammable gas if the average proportion of that gas, determined at different periods, exceeds ¼ per cent; to assure this, air samples are analyzed. Few of our mines could meet these severe conditions.

Every split should have at least 9,000 cu.ft. of air, and in a gassy mine air velocities should not fall below 200 ft. per minute or gas will not be removed from pockets or from places driven to the rise. Air that can be breathed only with difficulty and the smoke from explosives reduce human efficiency and are injurious to health. Wide and frequent crosscuts are costly extravagances when not needed because stoppings are expensive and the leakage they permit puts a big burden on the fan.

Even where there is plenty of air in the headings, there may not be enough at the working face, because of open or leaky crosscuts, or there may be insufficient air for those men who work too far from a definitely controlled air current. If the law calls for crosscuts 80 ft. apart, men, nevertheless, may be working more than 100 ft. from a controlled air current before the next crosscut is completed. Where they have to work farther from circulating air, a brattice cloth may be hung part of the way to induce the air to reach the face, but a portable blower and tubing will give a more assured supply and drive it with so much speed that it will not fail to reach the face (see Figs. 2 and 3).

In Fig. 2, the space curtained off at the side of the conveyorway takes about one-quarter of the space occupied by the airway, and a scale of air, being merely trapped into following the curtain, has no more pressure than the main current, and has to travel farther (up to face and back to heading) for the same fall of pressure as between entrance to curtained space and emergence from conveyorway, so it cannot travel very far or in any satisfactory volume. To state it in other words, while a fixed circuit is provided for the diverted air almost to the working face, such a wholly insufficient motive force is behind it that it will not continue to travel in the desired direction without further guidance.

In Fig. 3, a fan supplies air to tubing and, though the cross-section of the tube is small, the pressure greatly exceeds the pressure difference existing in the main current between the two sides of the conveyorway, but there will be recirculation of the air if

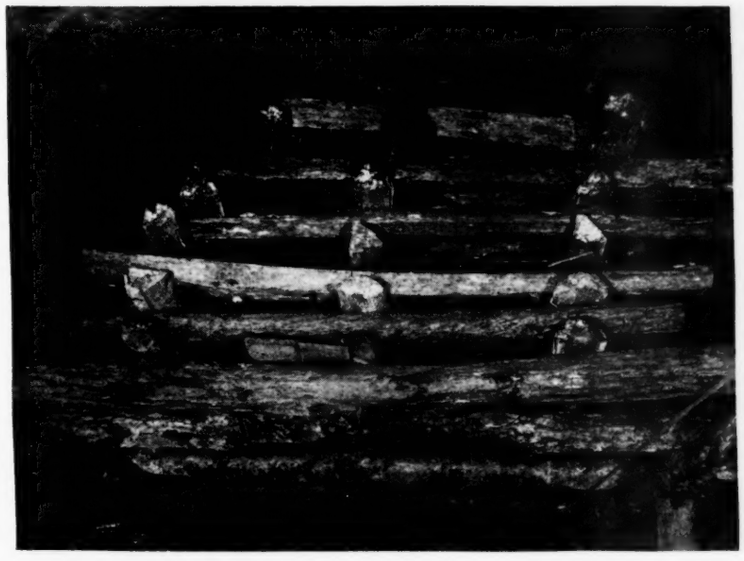


Fig. 1—Timbering like this puts a heavy load on ventilating equipment. In this instance probably the rock fall that necessitated it was inevitable, but sometimes prompt posting or guniting will prevent such falls by forestalling the destructive action of the air.

the fan is not set far enough back around the corner.

If the ventilation of a mine is measured at a single inlet and outlet, the input and output volume at those points should be nearly equal, provided the outside temperature is 60 deg. F., about the normal temperature of a coal mine. It should not vary over 15 per cent at other times, but there may be reverse currents in the fan or its setting, surface leaks around the air shaft or drifts, breaks from the mine to the surface, etc., all of which should be investigated and corrected where they reduce the air reaching the face or make the measured quantity of exit air differ too much from the measured quantity of intake air.

However, more air always passes through the fan than reaches the working face, due largely to open doors and leaks in doors and stoppings between the incoming and outgoing air; these cause part of the air to be short-circuited. There also may be leaks in shaft, curtain walls, drift lining, surface cracks, etc.

In one mine the average air loss for rough board stoppings was 340 c.f.m.; with tongued-and-grooved boards it was reduced to 180 c.f.m.; slate or gob dry wall passed 240 c.f.m.; the same cemented on one side, 170 c.f.m.; a 4-in. brick wall, 26 c.f.m.; an 8-in. brick wall, 10 c.f.m., and good concrete blocks, 6 c.f.m. Besides their other disadvantages, doors cause a much greater loss than stoppings, 2,000 to 4,000 c.f.m. per door, and money would often be well spent also in the building of good overcasts and in the elimination of doors. Crosscuts should be avoided as far as possible, and none should be driven any wider than will enable them to serve their purpose.

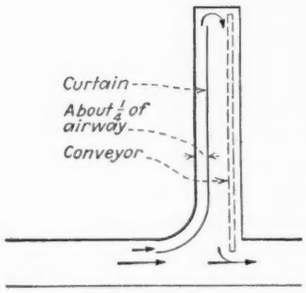


Fig. 2—Curtain ventilates conveyorway.

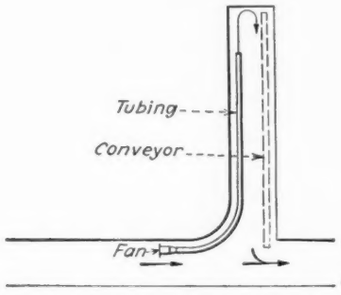


Fig. 3—Air delivered by auxiliary fan.

When the pressure of the air is increased, more leakage occurs at doors and stoppings; for this reason, in parts of the mine under the highest pressure, crosscuts should be driven no wider than necessary and be provided with the best stoppings. In some sections of the main airways, it may be possible to separate intake and return airways by such a considerable distance that leakage cannot occur, or to provide an entirely new intake so that leakage will be eliminated and permanent stoppings will not be required.

Infrequent Crosscuts

If there are four or more parallel entries, with two or more for air in each direction, they may be driven several hundred feet without connections between intake and return systems. Auxiliary fans and tubing may enable a single heading or a pair of headings to be driven with infrequent crosscuts. Though this increases the cost of gathering coal, it may be profitable. Unless a mine is small, main entries usually should have at least two intake and two return airways. The same quantity of air carried by two headings of equal cross-section will require only one-fourth as much pressure as if the same volume were carried in either one of them.

With the aid of conveyors, which can provide transportation beyond the main air current and therefore beyond the trolley line, four, six, or more headings can be driven conveniently for 300 or more feet without any connections between intake and return airways, thus avoiding the hand-tramming or other transportation cost which otherwise would be inevitable. So short a transportation could be handled only by such specially provided and inefficient haulage units as could operate safely and legally in a gassy atmosphere. However, by conveyors, cost of erection of stoppings will be saved, as also the leakage and maintenance which will be involved where the air has to return through one or more headings in the same entry (see Fig. 4).

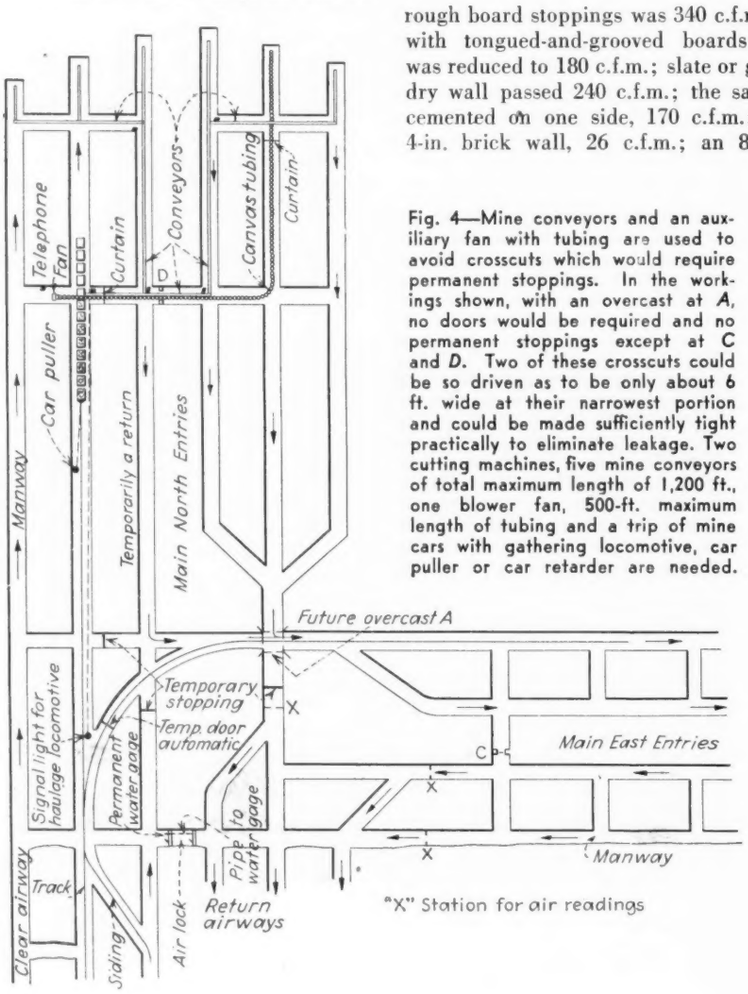


Fig. 4—Mine conveyors and an auxiliary fan with tubing are used to avoid crosscuts which would require permanent stoppings. In the workings shown, with an overcast at *A*, no doors would be required and no permanent stoppings except at *C* and *D*. Two of these crosscuts could be so driven as to be only about 6 ft. wide at their narrowest portion and could be made sufficiently tight practically to eliminate leakage. Two cutting machines, five mine conveyors of total maximum length of 1,200 ft., one blower fan, 500-ft. maximum length of tubing and a trip of mine cars with gathering locomotive, car puller or car retarder are needed.

DRAWSLATE IS HELD

And Operating Costs are Reduced With Conveyor Loading in Pittsburgh Seam

Speak of the Pittsburgh seam to a mining man and the difficulties of holding the drawslate characteristic to that bed inevitably enters the discussion. But Jefferson Coal & Coke, as Mr. Ferguson shows, is not only overcoming these difficulties by systematic timbering but also has lowered over-all production costs through the installation of self-loading conveyors. And a cleaner product goes to market.

By CLAUDE FERGUSON
Superintendent, Jefferson Coal & Coke Co. Avella, Pa.

DRAWSLATE is a major problem in mining the Pittsburgh seam. The Jefferson Coal & Coke Co., Avella, Pa., is successfully holding this drawslate and the top coal overlying the seam. Cover in this Washington County area varies from 10 to 200 ft. The seam itself averages 54 in. in thickness; the overlying drawslate averages 18 in., and above that is 3 to 6 in. of top coal. By successfully posting this drawslate and loading out the underlying seam of coal with shaker-duckbill conveyors not only has a clean product been obtained but lower operating cost has resulted.

Systematic timbering has been the solution of the "drawslate problem." Fourteen 18-ft. steel "H" beams weighing 7½ lb. per foot and supported by Type M-15 Templeton, Kenly quick-acting screw jacks provide a rapid and safe means of supporting the drawslate. As soon as loading has progressed sufficiently, an additional "H" beam is placed under the drawslate as close to the face as possible and held by screw jacks. By setting the beams as soon as possible, the drawslate is not allowed to "spring" and can be held more securely.

The use of a third-shift timber and supply crew has proved advantageous in replacing the steel beams with 12-ft. x 4-in. x 6-in. wooden crossbars. By so doing, enough beams and screw jacks are made available to permit advancing the steel beams with every cut on the loading shifts. Both steel beams and crossbars are set on 3-ft. centers. Posts are set so as to provide sufficient space between the pan line and the rib for a travelway and parking space for a Goodman Type 112EJ shortwall machine. The crossbars extend over the pan line far enough to give adequate protection.

Rooms are driven 300 ft. deep, 28 ft. wide on 35-ft. centers from the butt entry. Three Goodman Type G-12½ shaker conveyors with No. 1 pan line and Type A1C automatic self-loading duckbills are used. A Goodman Type 90-L chain flight elevating conveyor is placed in the breakthrough between the butt entries and conveys the coal from the three units to the mine cars at the loading point. The units to the right and left of the center room are equipped with 90-deg. angle troughs. The unit in the center room discharges directly over the end of the elevating conveyor (Fig. 2).

Holes are drilled with a post-mounted Chicago Pneumatic electric drill. Two center holes are drilled from the same set-up. No. 1 (the snub shot is drilled about 12 in. above the "bearing-in bands" and loaded with Atlas-Apcol permissible powder, while Nos. 2, 3 and 4 holes are loaded with Atlas pellet powder. All holes are drilled to within 6 in. of the back of the 8-ft. undercut.

No. 1 (the snub shot) is fired and cleaned out all the way to the back of the cut. This procedure is very important because it gives the lighter charges in the wing shots, Nos. 3 and 4, a chance to roll the coal down into the open space instead of merely "setting down" on the bottom and packing. All charges are electrically detonated.

Room work follows a definite procedure; the cooperation and coordination of the face crews account for much of the success of the loading cycle. Assuming that the face is undercut, kerf cleaned, and all holes drilled, the loading cycle proceeds as follows.

1. No. 1 (snub shot) fired and the resultant fall cleaned out to the back of the cut. No. 1 man, duckbill operator, and No. 2 man, helper, operate the duckbill, while No. 3 man, the shortwall operator, works on his machine, setting bits and greasing (see Fig. 1-B).

2. Center hole fired and coal loaded out. Three safety jacks set to hold slate (Fig. 2-C).

3. Right rib shot fired and partially loaded out. While No. 1 man loads, Nos. 2 and 3 set an "H" beam as close to the face as possible. As soon as space permits, a second "H" beam is placed. No. 3 man then moves the cutting machine from its parking place along the right rib to position at the face and sumps in preparatory to cutting across the room (Fig. 1-D).

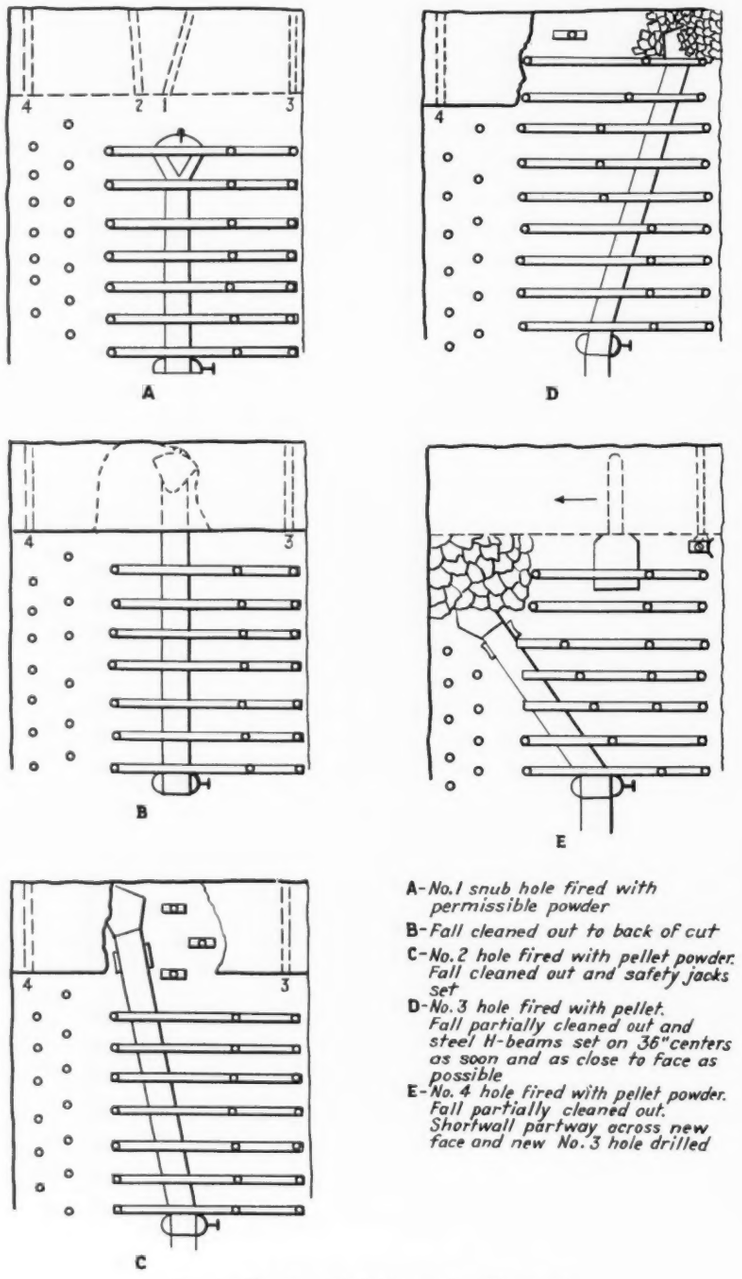
4. Left rib shot fired. No. 1 man loads, No. 3 man is cutting across the face, and No. 2 has set up his drill and drills No. 3 hole. As the shortwall machine nears the left rib, the

drill is moved to the center of the place and Nos. 1 and 2 holes are drilled (Fig. 1-E).

5. When the cut is finished, No. 3 man parks his machine along the right rib, No. 2 man cleans kerf and No. 1 loosens the trough bolts and "C" clamps on the telescopic trough preparatory to advancing. Nos. 1, 2 and 3 men then advance the telescopic trough by threading the rope from the left-hand drum of the machine through the face sheave to the operating carrier of the duckbill. When the duckbill is in position, Nos. 1 and 3 men tighten the bolts and clamps while No. 2 man drills No. 4 hole (Fig. 1-A).

A crew of ten men, three face men and one car trimmer are used on each of the two loading shifts. A floating third-shift crew of two men and a foreman replace the steel "H" beams used during the loading shifts with permanent 12-ft. x 4-in. x 6-in. wooden crossbars supported by posts. This is important because there are 14 steel beams and 43 screw jacks at each face for use on the two loading shifts. The floating crew also brings in all necessary supplies and performs any other tasks necessary to keep the rooms in good operating condition.

Time studies show the efficiency of the operation. Despite the great length of time required for timbering (26.3 per cent of the total man-minutes), the conveyor crews are loading an average of 18.1 tons per man. The crews upon which this tonnage is based consist of eighteen face men, two car trimmers and two foremen on the loading shifts. The timber crew, which also must be used in calculating the man tonnage, is composed of three men and a foreman who timber in all three rooms. There is a total of 26 men directly applicable on the total daily tonnage produced on the two loading shifts.



A-*No.1 snub hole fired with permissible powder*

B-*Fall cleaned out to back of cut*

C-*No.2 hole fired with pellet powder. Fall cleaned out and safety jacks set*

D-*No.3 hole fired with pellet. Fall partially cleaned out and steel H-beams set on 36"centers as soon and as close to face as possible*

E-*No. 4 hole fired with pellet powder. Fall partially cleaned out. Shortwall partway across new face and new No.3 hole drilled*

Fig. 1—Shooting, timbering and cutting cycle.

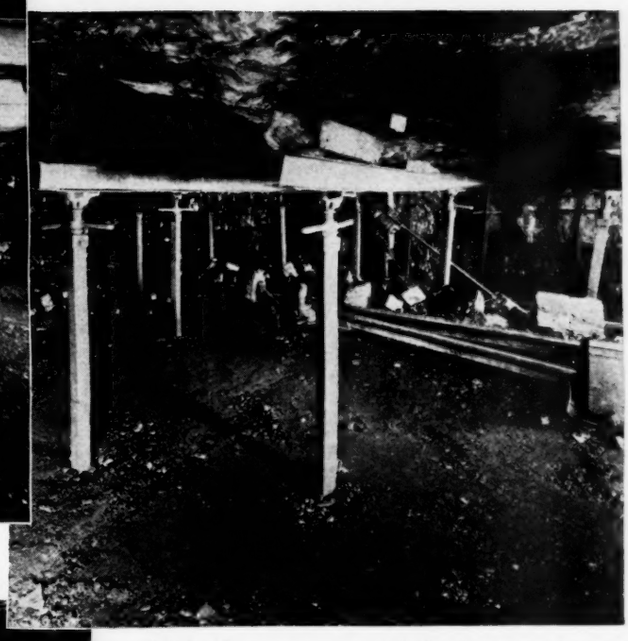
Load 40 Per Cent of Time

As can be seen from the bar chart (Fig. 3), only 40.1 per cent of the total man-minutes in the shift is spent in actual loading. The greater percentage of the time is spent in face preparation. All of the mine personnel have concentrated on cutting, drilling, and timbering until those operations have reached an established smooth cycle that accounts for much of the efficiency of the operation. Each man knows his job and when it must be done to keep the preparation cycle running smoothly. The face crews work with a minimum of lost motion. A cooperative spirit between the two loading crews has been developed and this materially aids in increasing the tonnage.

Prior to adopting the system just outlined there was considerable experimentation to find the most rapid and economical means of mining. At first, rooms were driven to completion and a slab cut was taken from the right rib on retreat. While this procedure was satisfactory as far as production was concerned, it was found that the drawslate would not stand up as well as in the present system.

Under the present plan, the rooms are driven 28 ft. wide on 35-ft. centers and the rib is left untouched. While the drawslate slacks and tends to cave shortly after exposure to the air, the rapid room completion possible under the present methods allows the safe posting of the drawslate and permits driving the rooms to full 300-ft. depth. When rooms are completed, the posts are pulled and the worked-out room is allowed to cave. This system has worked out

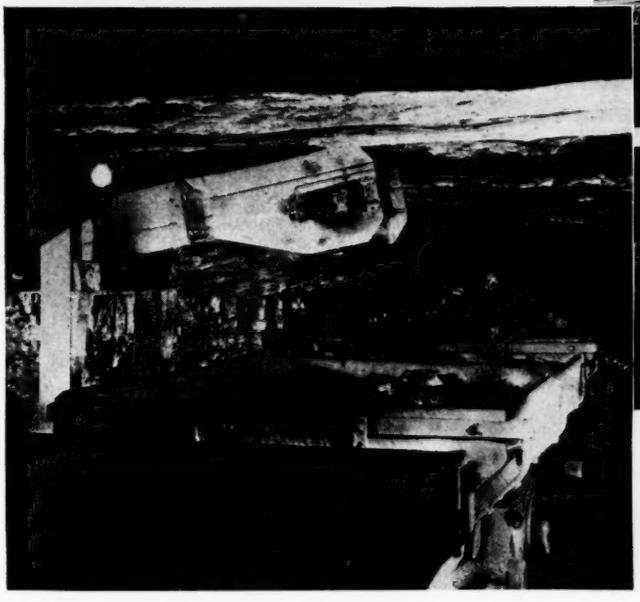
Conveyor operating under 4-in. steel "H" beams supported by screw roof jacks.



Self-loading conveyor in right-hand corner of room; right-hand side loaded out first to permit commencement of cutting cycle while left-hand side is being loaded out.

Shaker conveyor located in right-hand room, 90-deg. angle trough shown turning conveyor along entry to discharge point. Note thick drawslate supported by crossbars.

Receiving end of elevating conveyor showing three room conveyors discharging.



Car-loading point showing discharge end of elevating conveyor.

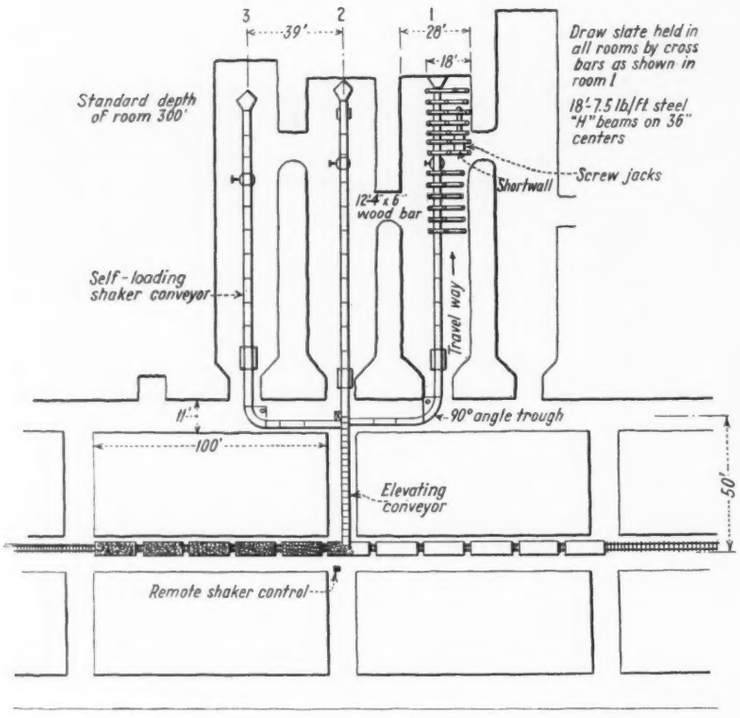


Fig. 2—Outline of three-conveyor set-up.

very well, as the excellent safety record shows. Approximately 80 per cent of the timbering is recovered. The normal production per shift per unit is two complete 8-ft. cuts. The rooms then advance 32 ft. per day, or a total completion time per room of approximately eight to ten days.

Power for the mine is furnished by the West Penn Power Co. A circuit breaker is used at the neck of the butt panels. General Electric circuit breakers also are used in room necks to protect both cutting machines and shaker drives. Cars are moved past the discharge end of the elevating conveyor by a 6-ton locomotive. The trolley wire is broken about 300 ft. from the loading point and an insulated cable used to carry the power from the break to the loading point through a circuit breaker and from the circuit breaker to the trolley wire opposite the loading point. The locomotive controller is set on one point and the brakes are partially tightened. By operating the circuit breaker, the car trimmer can move the trip as desired. A safety factor of some importance is thus obtained because the trolley wire at the loading point is dead except when the car trimmer is moving the trip.

The coal, loaded in 2.2 Sanford-Day drop-bottom mine cars, is hauled to the headhouse of the tipple by a 6-ton Goodman Type 3304T.5 locomotive.

In view of the problems encountered in mining the Pittsburgh seam enumerated in the preceding discussion, the management chose conveyor and duckbill equipment for the following reasons:

1. The most inexpensive way to take care of the Pittsburgh seam drawslate is *not* to handle it at all. The systematic close timbering made possible by the use of shaker conveyors and duckbills takes care of the problem adequately.

2. Since height is no prime factor in conveyor mining, the slate can be held up and the coal extracted from beneath.

3. No rolling stock is tied up in waste disposal; neither is space along the ribs or the breakthroughs.

4. Powder charges are reduced. Coal does not have to be rolled away from the face for the duckbill to operate. Decreased charges per hole mean greater percentage of lump coal.

5. It is possible to obtain a cleaner product. The exposed slate will not "dribble off" each cut. Coal travel is sufficiently slow to permit hand-picking impurities at the face.

6. All track is eliminated in rooms. Cars and locomotives do not enter the rooms, which means greater safety for the men.

7. All equipment is kept at one working face. Tramming time does not enter the picture at all and a greater effective loading time is thus obtained.

8. A more simplified system can be used, since rapid car change does not have to be considered.

9. Lower maintenance cost because of the simplified design of the equipment.

10. The men can work more efficiently on productive work because no time is consumed in gobbing the drawslate along the ribs.

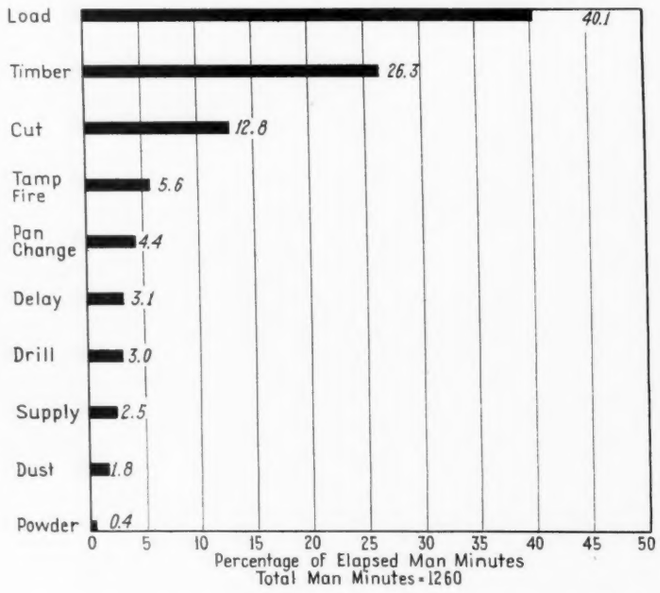


Fig. 3—Time study of Jefferson operating cycle made June 1, 1940.

GREASING MACHINES

Plus a Report System Assure Efficient Lubrication of Loaders

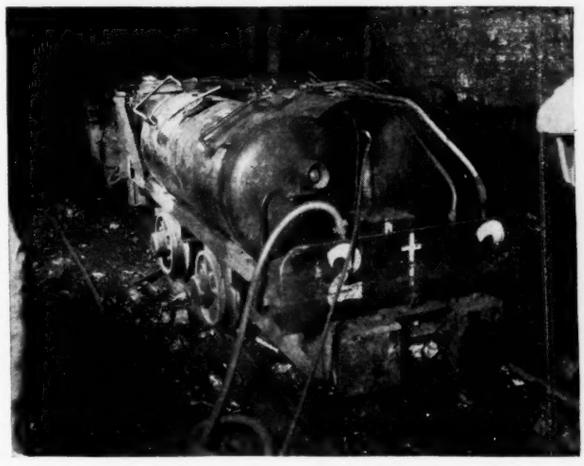
Loss of lubricant and contamination in handling have been checked at Kings mine by the use of special greasing machines providing clean, metered delivery. These are supplemented by maintenance of loading machines to prevent loss from gear cases, etc., and by lubrication reports which also serve as maintenance guides. Other features of lubrication at Kings include a shaft-bottom station for mine cars.

By JAMES GUINEY
Master Mechanic, Princeton Mining Co.
And IVAN A. GIVEN
Associate Editor, Coal Age

WITH INCREASED use of mechanical-mining equipment, cost of lubrication and its effect on performance necessarily are getting more attention from operating and maintenance men. The problem, particularly as it affects loading machines and auxiliaries, has been attacked at the Kings mine of the Princeton Mining Co., Princeton, Ind., by providing special equipment for transporting and applying lubricants without waste or contamination, and by maintenance of equipment to prevent lubricant loss and consequent heating, damage and loss of production. Lubrication reports show quantities applied to all parts of each loader and serve as a check on consumption and machine condition.

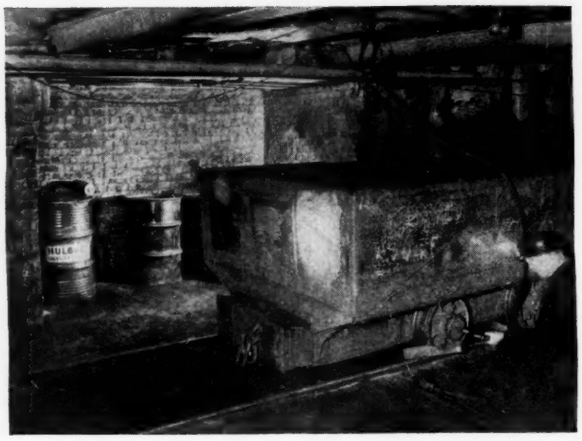
Some of the difficulties encountered in old-style loader lubrication are: careless handling of oil barrels and grease drums in transportation; leaving barrels and drums open to fine dust and dirt; waste and contamination in pouring oil or grease into dirty buckets and cans, with resultant contamination of lubricant in clutch and transmission cases and damage to gaskets and bearings; waste in pouring lubricants out of cans and buckets into machines; and destruction of seals by dirt, wasting lubricant and causing clutches to heat and burn. All these stem from careless handling, increasing expenditures for oil and grease, damaging machinery, running up repair costs and hampering production.

Consciousness of these difficulties and of the lack of a lubrication record was responsible for a change to present practices in April, 1937, including construction of greasing machines and institution of a report system. Loading equipment comprises two Goodman 260-A, six Joy 5BU, two 7BU, one 8BU, two 10BU and two 11BU machines. Three track-mounted cutters (one Jeffrey 29-LE and two Sullivan CLU) also are served by the



Two views of a greasing truck in use in Kings mine.

Greasing a loading machine in Kings mine, with the man at the right operating the high-pressure hose and nozzle.



Car-greasing station on the bottom, with drums and gun in the alcove at the rear and hose connection over the car.

greasing units. All production equipment works two shifts per day.

The greasing machines, two in number, were designed to permit transporting lubricants in special tanks, thus rendering unnecessary storing of barrels and drums on each territory. The machines were built on regular mine-car chassis with ball-bearing wheels and standard drawbars and bumpers for operation with any locomotive or trip of cars. Overall length is 9 ft.; width, 52 in.; height above the rail, 48 in. Shields and guards protect special equipment.

Each machine includes two 150-gal. welded tanks. A bulkhead in one divides it into 100- and 50-gal. compartments. The 150-gal. tank carries Socony-Vacuum No. 480 loader grease; the 100-gal. compartment, Standard of Indiana No. 2 hydraulic oil; and the 50-gal. compartment, No. 30 Polarine for the front clutches on the 10BU machines—also the hydraulic oil. Four-inch openings with special sealing caps are used for filling.

Flowmeters to register the quantities of oil and grease used at all points except high-pressure fittings are mounted at the tank outlets. Three 1-in. flexible hoses 40 ft. long permit taking oil or grease to any part of a loading machine. For pressure fittings, a high-pressure Alemite gun, with a pipe connection to the grease tank, is mounted on top of the machine. It is equipped with a ¼-in. high-pressure hose 40 ft. long with nozzle for Zerk fittings. At the rear end of the tanks is a Westinghouse or General Electric traction-type air compressor with automatic electric control switch, safety valve and pressure gage. Power for the compressor motor is obtained from the locomotive through a 2-conductor cable. Thus, the 120-lb. tank pressure can be maintained in transit.

Two men comprise a lubricating crew and all greasing of loading machines and track-mounted cutters is done on the third shift. This includes greasing armature bearings with a hand gun, the machine taking care of all other points. One greasing, therefore, lasts each loader or cutter two working shifts, or 14 hours. Greasing machines are filled on top during the first shift. Each filling is sufficient for two greasings, or four shifts of loader and cutter operation. Filling is done with an overhead crane, barrel hooks and a pipe stand on which the barrel rests while grease or oil runs into the tanks, thus releasing the crane for other duties. A warming box heated with steam holds four barrels of lubricant and insures complete drainage of each container in cold weather.

Forms are supplied the lubricating crews for recording the quantities of oil and grease applied at each point on a machine, as determined by reading the flowmeters, keeping count of turns on the hand gun, etc. These reports go to the underground supply clerk at the end of each shift and a record is posted so that men in charge of underground maintenance can see

GREASE REPORT DATE 11-16-40 OILER Truck No 2.3 S.

LO'R No.	ALEMITE	DISC	FRONT CLUTCH	REAR CASE	SIDE HOPPER	HYDR-AULIC	ARMATURE	TOTAL
14	½	1½		3½		1	√	6½ Gallons
2	1	½	1	2½	1		√	6.0 "
Jeff.	½		1¾				√	2¼ "
3	¾		1½	½		1	√	3¾ "
5	½			½	½	2	√	3½ "
15	¼						√	¼ "
13	½	1½		1¼		1	√	4¼ "
4	¾		3½			1	√	5¼ "
								31¾ Gallons

REMARKS

Fig. 1—Typical daily loading-machine greasing report.

how the consumption runs on each machine. On numerous occasions, such men have been warned of a defective oil seal or leaky case before it was spotted by the operator or repairman. A substantial increase in lubricant consumption is a warning that repairs or overhaul are necessary. Thus, a machine can be given attention before a major breakdown occurs. Preventive maintenance in turn cuts lubricant consumption.

Records of lubricant used also are sent to the office clerk, who checks them against the quantity in each barrel as the grease machines are filled. From these daily records it is possible to ascertain the cost of lubricating each machine and also keep a running record of oil and grease in stock. In addition, the daily records may be used for weekly or monthly summaries showing lubrication cost per ton.

Steps also are being taken to improve lubrication of other underground equipment. On the 112-AA shortwalls, for example, intermediate shafts are being fitted with McGill needle bearings with screw-down cups. The first were installed over a year ago and none has been replaced. Ball bearings also are being installed on the bottoms of the main shafts, which are drilled and fitted with grease cups. The regular loader grease is used in such bearings, a cupful lasting about two days (four shifts). On machines not yet refitted and on other parts of rebuilt machines, the lubricant is Standard steam-refined cylinder oil applied in the usual manner.

Steam-refined cylinder oil also is used in locomotive axle caps, with Hulburt waste in journals. Brass journals, however, are being replaced with Goodman solid-roller bearings as overhauls take place. Armatures on locomotives, loading machines and other underground equipment, with the exception of shortwalls, are equipped with fittings for Alemite high-pressure guns, using Hulburt 315 grease. One man is employed each night to pack and lubricate locomotives, and a record, covering both armature and other lubrication, is posted for checking to insure all locomotives receiving attention as they need it.

The Chicago Pneumatic post-mounted drills at the mine are lubricated with Hulburt 315 grease as they are repaired. In case one fails to come in in about a year it is called in for inspection and lubrication.

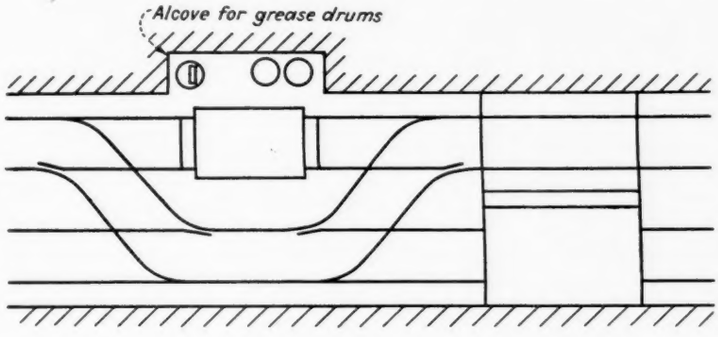


Fig. 2—Showing layout of Kings car-greasing station just below the hoisting shaft.

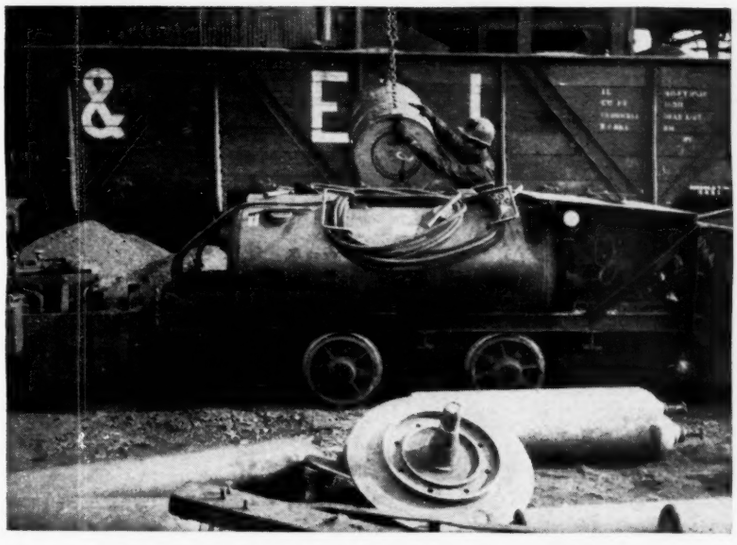
Except for 16 new big cars, which will be lubricated by hand on the working section when the time comes, mine-car equipment at Kings is greased on the empty side of the hoisting shaft. Most of the wheels are equipped with Timken bearings, with Fafnir and New Departure ball bearings on the remainder, including a few sealed-for-life units. As shown in accompanying illustrations, car-greasing equipment and drums are placed in an alcove just below the north hoisting compartment. Cross-overs above and below divert other cars around while one is being greased.

An Alemite gun mounted on a drum feeds Hulburt No. 3 grease through pipe to a hose connection just above the greasing track. Cars are caught as they come off the cage and, after greasing, are spotted with paint. Blocking and greasing is handled by one man, who can lubricate as high as 150 cars per shift at the start of a greasing period, the rate decreasing with the number ungreased.

Oiling of motor-generator sets and similar equipment usually is done by electricians, using Havoline SAE 10.

Lubrication of surface equipment at Kings follows long-accepted practices. Storage tanks provide a constant feed to lubrication points on the steam hoist and on crossheads, shakers and other equipment in the preparation plant. Hulburt high-temperature grease is used on a Marcus screen drive.

Ropes on the coal hoist are treated with Standard rope dressing at least every two weeks in severe weather. The dressing is heated and poured on. Ropes on the man cage in the airshaft, which runs rather slowly, gather considerable dust which tends to form a hard crust. The practice is to scrape off the crust, put on a penetrating oil and then apply the rope dressing.



Filling a greasing machine on the surface. The overhead crane is lowering a drum into position on the holding stand.

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PIONEER KANAWHA MINE

With Hand Loading on Conveyors Averages 12.3 Tons per Underground Shift

By ROGER W. TOMPKINS
President
Cedar Grove Collieries, Inc.

THE MINE that came back through modern methods provides an interesting chapter in the story of coal. William Tompkins, grandfather of the writer, first used Kanawha coal to recover salt by boiling at his plant in Malden. Later, around 1845, he opened the first coal mine in the Great Kanawha Valley at Cedar Grove, W. Va., employing negro slaves as miners and transporting the coal on flatboats to his salt furnace, 14 miles down the river.

Extensive production at Cedar Grove, however, did not begin until 1876, when Preston and John Tompkins, sons of William, started operations in the Cedar Grove seam. The coal, mined by hand, was laboriously loaded and carried to the markets in small barges poled out of the shoal water and then pushed by steamboats to the Ohio River. Operations were suspended in the dry season.

Around the plantation which encompassed the coal lands were a number of workers and their families. The farm was cut into town lots, houses were built, and the town of Cedar Grove was born. All during the "gay nineties" the Cedar Grove Mining Co. carried on. As the years went by, however, larger interests overran the hills, crowding out the small mine. The brothers died, the lease passed into other hands, and the mine closed down. It seemed finished.

Grandsons of the first owner took over in 1925, when Harold P. and Roger W. Tompkins organized the Tompkins Fuel Co. and resumed operations on a modest scale in the No. 5 Block seam. In 1935 they became associated with the Richvein coal interests and reorganized as Cedar Grove Collieries, Inc. The mine was electrified, modern machinery installed, new tipples were built and new appliances and innovations were introduced. At that time the Cedar Grove seam was reopened in new territory and additional acreage was leased. With the death of Harold Tompkins in 1938, sole management of the mine fell upon the writer.

Five room conveyors do the whole job, including development work. Average output per man-shift is 10.5 tons. This figure takes in all employees except office and commissary personnel and includes the superintendent. For underground workers alone the average is 12.3 tons per man-shift. Maximum seam thickness is 36 in., and the minimum, where roof rolls occur, is 27 in. Coal is free of partings. Top is slate, which is tender in places and, in some rooms, several inches of it comes down. The bottom, generally level, is a hard slate. Very little water is encountered in the workings proper and no gas has been detected.

Roger W. Tompkins

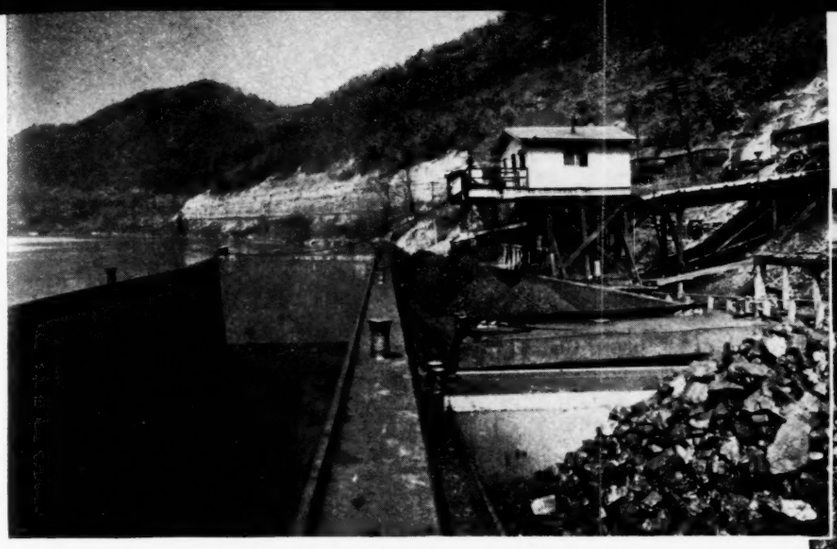
Haulage headings and aircourses of mains, butts, lefts and rights are 25 to 30 ft. wide on 75-ft. centers. Rooms are 300 ft. deep on 75-ft. centers, 50 to 55 ft. wide. Room pillars are abandoned. Barrier pillars 250 ft. wide protect main haulways. Top is brushed on haulage headings to give 5 ft. minimum height. This rock is gobbed or loaded by hand; nine men (three per shift) do this work.

Conveyor equipment consists of four Jeffrey chain and one Goodman shaker unit without duckbill. Units and their crews are shifted to and from room and heading work to maintain proper balance between development and mining. Each Jeffrey unit consists of one 300-ft. Type 61AM room or entry conveyor, one 61HG face conveyor and one 61EA elevator. A Goodman E-10-76 drive handles the shaker, which for room work is equipped with a 90-deg. turn.

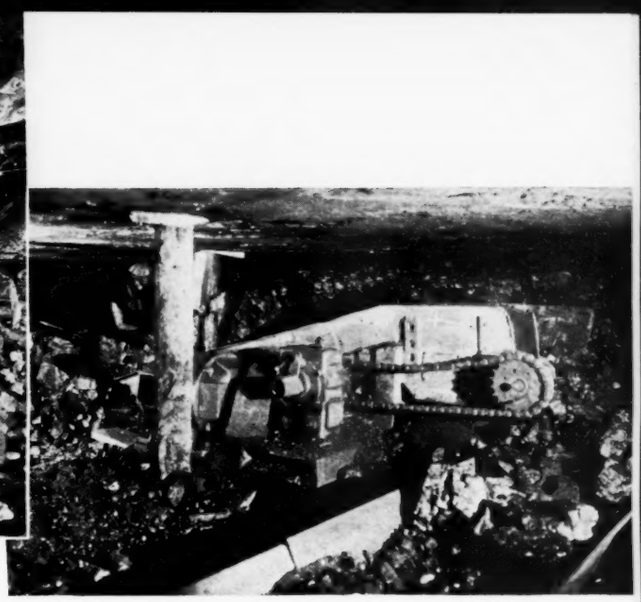
Present practice is to cut breaks through chain pillars opposite all room necks so that two rooms (total coal area 55x600 ft.) are mined per construction of each duck's-nest loading point. Rooms are cut through to those of the adjacent panels. Twenty-eight rooms per panel—14 on each side—is the projection now being followed in the main body of the coal.

Undercutting is done with five 35B Jeffrey machines—four with standard chains and plain hand-sharpened bits and one with Cincinnati chain and C11 Duplex throw-away bits. Five of the eight drills are Jeffrey A47 and three Little Giant types 374 and 371. Auxiliary ventilation for rooms and headings is provided by six Jeffrey centrifugal blowers connected to lengths of 12-in. du Pont Ventube.

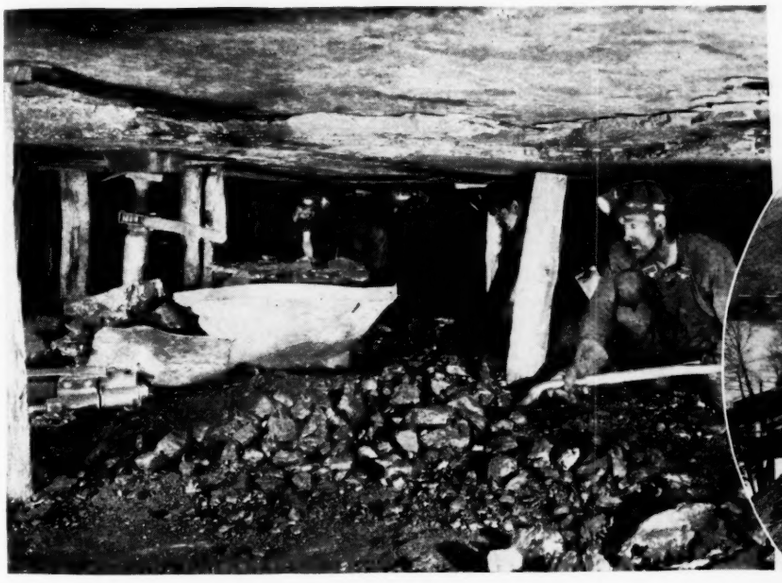
Coal is shot with du Pont Lump Coal C. Charges are bedded 6 in. from



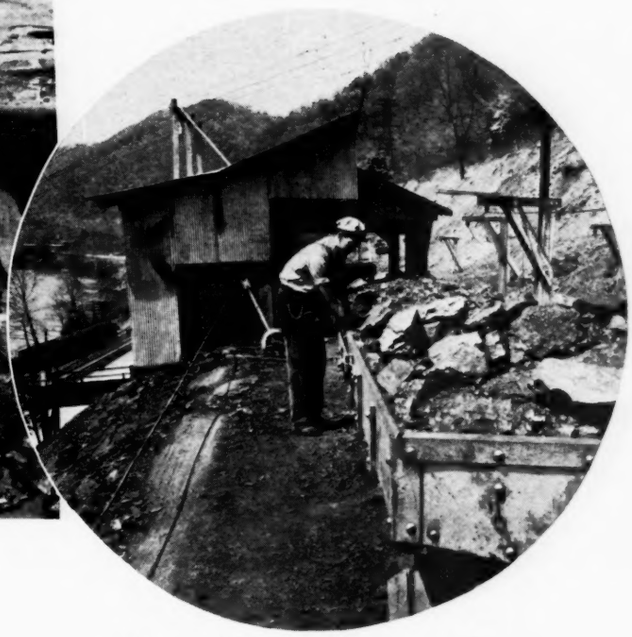
Cedar Grove coal is shipped via New York Central R. R. and the Kanawha River.



Chain-face conveyor discharging into room conveyor of the same type in 50-ft. room.

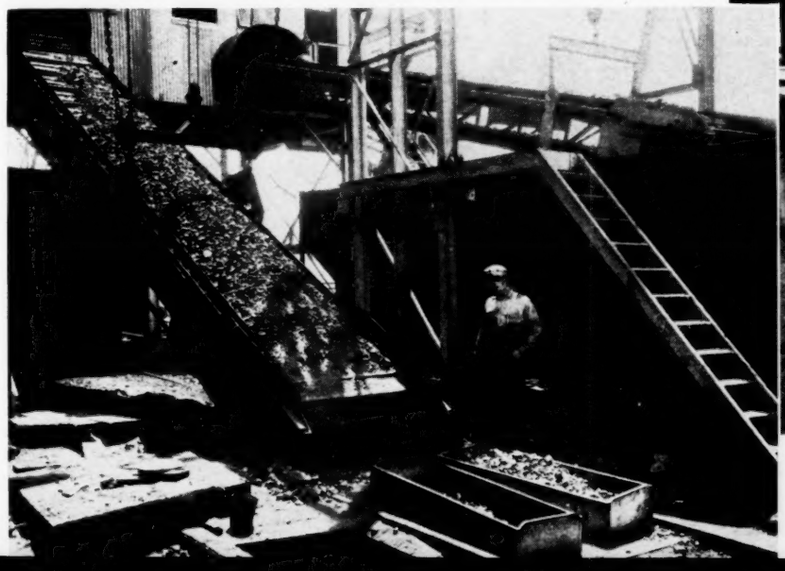


Shaker conveyor with 90-deg. turn at the face of a 55-ft. room.

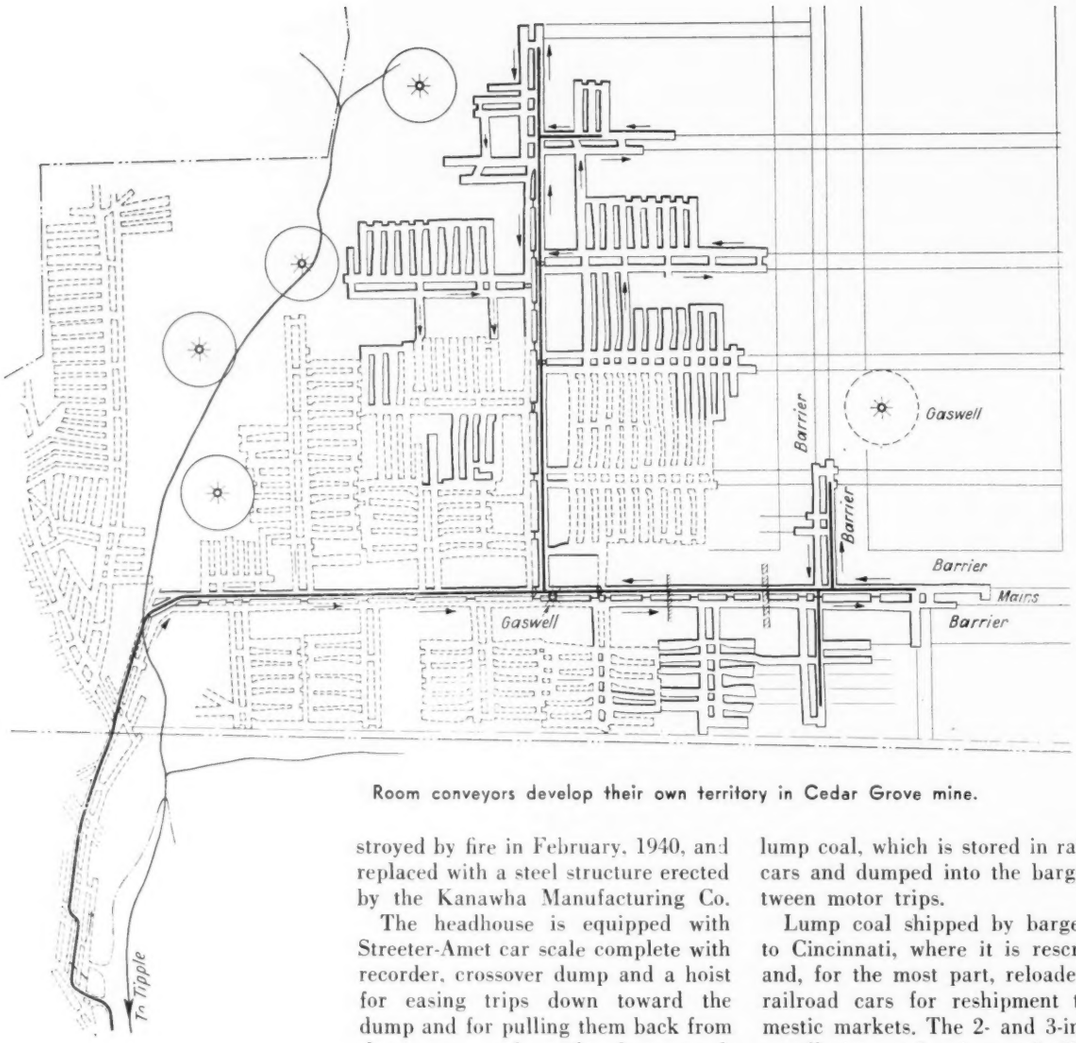


One man, here uncoupling a car, handles car feeding, weighing and dumping.

One boom lowers to discharge 3x0-in. coal into hopper of conveyor to river barge; the other boom, loading lump into a car, also can be lowered to the conveyor hopper between rails.



Two booms in normal position for loading entire output into cars.



Room conveyors develop their own territory in Cedar Grove mine.

the face and fired from Edison cap-lamp batteries. Two sticks are loaded into rib holes; one in each of the others. Room timbering is split and round posts are set on 3- to 4-ft. centers, depending on the roof. Props are seldom required ahead of the face conveyors.

Face crews normally consist of four men in rooms and three in headings. Thirty-five is the usual total underground force on the first shift, with 30 each on the other two shifts. There are nine men on the first outside shift and four each on the second and third shifts.

Mine equipment includes one 8-ton haulage and one 6-ton gathering locomotive, two stationary pumps, and 100 Kanawha 2.2-ton (conveyor-loaded) steel cars with Timken bearings. Mine tracks, 42-in. gage, are 40- and 50-lb. rails on the mains and 30- and 40-lb. on cross entries.

The original wooden tipple was destroyed by fire in February, 1940, and replaced with a steel structure erected by the Kanawha Manufacturing Co.

The headhouse is equipped with Streeter-Amet car scale complete with recorder, crossover dump and a hoist for easing trips down toward the dump and for pulling them back from the empty yard to the dump track when necessary. Cars arrive at the headhouse in 20- to 30-car trips and the locomotive travels over a crossover track to reach the back-switch in the empty yard. One man per shift (tipple operates three shifts) takes checks, records numbers and weights, and handles the car feeding and dumping.

A flight conveyor carries the coal overhead from the dump feeder across U. S. Highway No. 60 to the three-track steel tipple on the New York Central R.R. Three sizes can be prepared on a main shaker. The two loading tracks, which are spanned by the shaker screen, are equipped with apron-conveyor loading booms which can be lowered to ground level, to discharge into a track hopper. Coal is conveyed from this hopper over a unit with a hinged section at the end to discharge directly into barges on the Kanawha River. The tipple boom handling small sizes is 32 in. wide, the same width as the boom handling lump coal, which is stored in railroad cars and dumped into the barges between motor trips.

Lump coal shipped by barge goes to Cincinnati, where it is rescreened and, for the most part, reloaded into railroad cars for reshipment to domestic markets. The 2- and 3-in. coal usually is sent by river and all lump to date has been so transported. The coal is high-volatile, containing 4 to 6 per cent ash and testing 14,000 B.t.u. or better.

Buildings at the mine portal include a modern bathhouse with eight showers and 100 baskets. There is a lamproom in the same building with 130 Edison K lamps. All men working in the mine have had first-aid training.

Purchased power is converted to 250 volts d.c. for haulage and face operations by a 150-kw. General Electric motor-generator feeding through a KSA automatic reclosing circuit breaker on the outside of the main drift. Roebling No. 6/0 trolley wire and 4,600 ft. of 500,000-circ.mil feeder cable are hung one above the other on Westinghouse combination clamps. During a typical month when 24,113 tons was produced, the total power purchased for mine and tipple operation was 97,200 kw.-hr., or 4.03 kw.-hr. per ton.

SMALL MINE FIRES

Extinguished With Carbon Dioxide At Operations of Pittsburgh Coal Company

By H. C. ROSE
Production Manager
and E. C. SKINNER
Assistant to Superintendent, Lindley Mine, Pittsburgh Coal Co.

EXTINGUISHING incipient underground mine fires with the carbon dioxide contained in Cardox shells is now standard practice at the mechanized operations of the Pittsburgh Coal Co. Used primarily, of course, to break down the coal, in the case of fire each loaded Cardox shell becomes a potential extinguisher. The inlet valve on the heater end of the shell is opened by a standard $\frac{3}{8}$-in. Allen safety wrench and the carbon dioxide is allowed to spurt over the fire and smother it.

Shells may be held in the hands and played over the fire like a hose or, where the fire cannot be approached, the shells may be thrown on the fire. As many shells as necessary are used. The pressure of the escaping gas also is an excellent way of cleansing the atmosphere of smoke.

The system is in use at all mines of the company where Cardox is employed as the blasting agent. This includes those mines in which coal is loaded mechanically. Each loading-machine section is equipped with a complement of from 40 to 60 Cardox shells kept on racks near the working area where they are always within easy reach. Mounted on the same rack in a small glass-inclosed case is an Allen wrench. One of these wrenches also is carried in the tool box of each loading machine or service locomotive. Instructions for the use of Cardox to extinguish fires have been printed on placards in a few easily understood sentences. These cards are posted on the shell rack and on the mine doors.

When the system was started, fire-fighting demonstrations were held at the mines between shifts when all the men could be spectators. Oily waste fires were started in empty oil drums and were put out by tossing in a few shells after cracking the valves with the wrench and allowing the carbon dioxide to start escaping. Various kinds of fires likely to be encountered in mines were explained to the men and the best method of combating them was shown.

Several small fires have been quickly extinguished since the use of Cardox for this purpose was started. Each one of these fires might have been serious had it been allowed to develop. Two of the fires were caused by falls of roof coal bringing down the trolley without creating a dead short. The current was partially carried through the loose coal to the rail, causing heating and ignition of the coal. One of these fires was in an air velocity of 250 ft. per minute. Several Cardox shells were used in each case; the smoke cleared from the flame and the fires were soon under control.

A shotfirer discovered a third fire burning in the back of a cut which had been blasted with permissible explosives. Obtaining two Cardox shells, he opened the valves and tossed them on the loose coal. The carbon dioxide blanketed the fire and quickly put it out. In another case, the coal at the bottom of a shallow abandoned airshaft was ignited from a brush fire. Gas from Cardox shells was allowed to settle into the bottom of the shaft and the fire was extinguished.

The most important feature of this system is the fact that there is always at hand a quick, safe, and efficient way of extinguishing small fires before they can develop into dangerous mine fires.

The 13-ft.-thick seam of lignite is loaded from a 42-ft.-wide cut into 50-ton hopper cars.

TEXAS LIGNITE MINE

Producing 400 Tons per Day

Averages 19.05 Tons per Man on the Job

By CHARLES LAMBUR, JR.

Assistant Editor, Coal Age

TO RECOVER a 13-ft. seam of lignite, the McAlester Fuel Co., McAlester, Okla., opened the Sandow mine, Rockdale, Texas, in December, 1924. More than 35,000,000 tons is available for stripping and 30,000,000 tons for deep mining. Production has varied from a high of 300,000 tons in 1928 to the present 100,000 tons per year. Although the capacity is much greater, the output now is 400 tons per day and the average per man employed, including the superintendent and clerical help, is 19.05 tons per day. All equipment is steam-powered and standard-gage railroad equipment is used for transportation from the pit. The original stripping shovel with 3½-cu.yd. dipper was replaced in 1927 by an 8-cu. yd. unit and the 2-cu.yd. coal-loading shovel by a 2¼-cu.yd. unit.

It has been estimated that the lignite deposits of Texas aggregate more than 23,000,000,000 tons. However, the company estimates that the tonnage which has a commercial value and can be mined by today's methods is only 200,000,000. Sandow mine is one of the few remaining operations in the State and consideration of the fact that the Southwest in the last decade has produced 58 per cent of the natural gas consumed by the nation and 63.8 per cent of its crude oil reveals the almost unsurmountable barriers of competition that hinder development of the lignite resources.

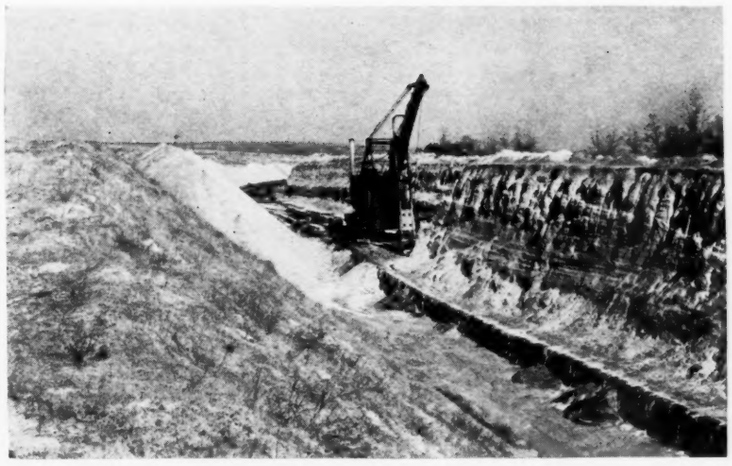
At Sandow mine the overburden is of Wilcox alluvium, an Eocene bed at the base of the Tertiary. It gives a firm well-standing high wall. No shooting is necessary. Pit width is 50 ft. The seam is a clean 13-ft. bed of lignite and is mined in a 42-ft.-wide cut without preliminary breaking. It is underlain by fireclay. The 2¼-cu. yd. shovel loads the lignite into 50-ton hopper cars made up in trips of four or five. These travel on track laid on top of the seam. Average haul to the tipple is one mile.

At the tipple, the cars are emptied into a Jeffrey 20-in. 30-ft. chain-drag conveyor laid under the track and discharging onto a Goodyear 24-in. 80-ft. belt conveyor that elevates the coal to the top of the tipple. Slate and impurities are picked out as the lignite passes over the drag conveyor. The belt conveyor discharges onto a 10-ft.x 40-in. grizzly which divides the mine-run into 1¼-in. plus and minus.

The 1¼-in. plus can be crushed to a top size of 1¼ to 6 in. in a 24x48-in. adjustable single-roll crusher, or can be bypassed. The 1¼-in. minus can be joined with the crusher output or loaded directly into railroad cars. By changing the grizzly-bar spacing, the mine-run also may be divided into 2-in. plus and minus. The present market requirements are met by an output consisting of 6-in. domestic lump, 6-in. crushed mine-run, 1¼-in. plus screened mine-run, straight mine-run and 2x0- and 1¼x0-in. industrial stoker.

All output, including pit haulage, is handled by a subsidiary, the Rockdale, Sandow & Southern R. R. and is hauled 6 miles for shipment over the International Great Northern R. R. Trucking facilities are available at this point in the form of a transfer station where 2-in. plus and 1¼-in. minus may be loaded from railroad cars into trucks by a 20-in. 20-ft. chain-drag and a 24-in. 30-ft. belt conveyor.

The operating force consists of five men at the stripping shovel, three at the loader, three on the track crew, one pit foreman who also is track foreman, five at the tipple, one truck-transfer-station operator, three shop men, one clerk, and the superintendent. The expense of the track crew and foreman is divided evenly between the railroad and mining companies. Thus the total of employees credited to the mine is 21.



A shovel with 8-cu.yd. dipper strips 20 to 50 ft. of sandy, alluvial overburden. Note the small extent of the slides along the highwall in the foreground, which has stood for three years.

As replacement parts are difficult to obtain quickly because of the distance from most manufacturers, efficient operation is maintained by a well-equipped shop for repair work. Equipment includes a 24-in.x12-ft. and 14-in.x6-ft. lathes, 24x42-in. steam hammer, 20-in. drill press, 6-in. pipe cutter and threader, 2,000-lb. steam hammer, power hack-saw, grinding machines, air hammers and motors, stationary and portable forges, 300-amp. portable electric welder, oxy-acetylene torches, air compressors, etc.

Average analysis of the lignite, as-received basis, is: moisture, 35.00 per cent; volatile, 28.12; fixed carbon, 27.00; ash, 8.98; and sulphur, 0.90 per cent, with a B.t.u. value of 7,055. The ash-fusion temperature is 2,200 deg. F. The coal is dull black in place, but when mined and sized it changes to a deep brown color which results when surfaces of the pieces are scratched. Lignite is used as both a domestic and industrial fuel and when ground ranks as one of the finest of the pulverized fuels for steam generation. The University of Texas is experimenting in dehydration processes for treating lignite.

Lignite is crushed and separated into six sizes at this tipple.

OHIO 75-TON TRUCK MINE

Profits by Electrification

And Boosts Dustlessness in Sales Pieces

By J. H. EDWARDS

Associated Editor, Coal Age

PREPARATION, haulage, cutting, ventilation and drainage—all of them electrified—seven sizes of coal made, permanent equipment installed for dustless treatment, five "Triple-Heart Coal" mailing pieces used as sales helps and a production of 6.8 tons per man employed—that preface would fit many large mines shipping by rail, but in this case it refers to the Hartz Coal Co.'s truck mine, Dover, Ohio, producing 75 tons per day. Among the recent improvements are a new diesel power plant to replace one of smaller size, and the acquisition of a locomotive. Use of this new haulage unit, made possible by the larger power plant, is saving at least 5½c. per ton.

John Hartz and his sons, Robert and Vincent, form the triple alliance of the company and from this the coal trade name was evolved. Robert is mine foreman and Vincent looks after truck deliveries from mine to customer. John Hartz is a practical miner who from 1913 to 1928 operated country coal banks, none using electricity. For many years he did use an air puncher powered from a compressor driven by a gasoline engine. In 1926 the gasoline compressor drive was replaced by a Fairbanks-Morse Y-type 35-hp. single-cylinder diesel engine.

The next step, in 1928, was to install a 250-volt generator driven by the same engine and to displace the puncher with a Jeffrey 17A breast machine. With that equipment Mr. Hartz, in 1935, opened a new mine, a drift at tipple height, in the present location 2½ miles northwest of Dover in Tuscarawas County and 78 miles south of Cleveland. In 1936 the breast machine was displaced by a Morgan-Gardner shortwall rebuilt with live tail rope by the Cambridge Machine & Supply Co., of Cambridge, Ohio. In the early summer of 1940, ponies for main haulage gave way to a locomotive and about this same time a brand new diesel engine and generator were installed.

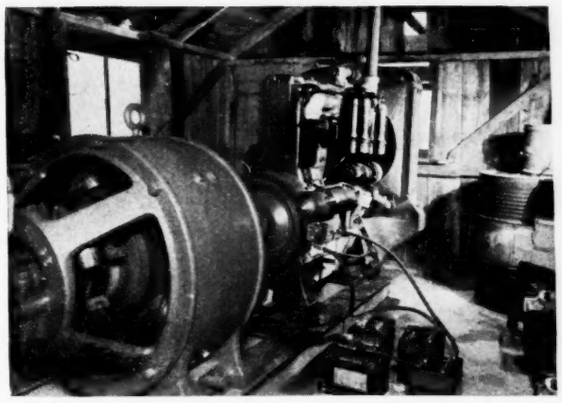
The mine lease, specifying a 15c. royalty, covers a 40-acre tract of Ohio No. 5 seam 4 ft. thick and lying practically level. A continuous ½-in. parting of hard "white sulphur" occurs 8 in. from the top and is picked out by the loaders. The immediate roof is a gray "soapstone" and the bottom a hard fireclay. Maximum cover is 180 ft. Headings are driven 11 to 12 ft. wide and the rooms 30 ft. wide on 35-ft. centers and 250 ft. deep.

Undercutting with the shortwall is done with a 5½-ft. bar equipped with Bowdil chain using throw-away bits. In the words of John Hartz, "the throw-away bits are a great improvement over the old blacksmith-sharpened bits." Where he used 45 bit points before, six points now do the same quantity of cutting and an outstanding advantage is that no bit gaging is necessary.

The power plant consists of a new Cummings 4-cylinder Type HL-400 1,200 r.p.m. diesel engine with continuous horsepower of 50, peak horsepower of 63; bore, 4⅞ in.; stroke, 6 in.; and piston displacement, 448 cu. in. This is direct-connected to a Westinghouse Type SK 45-kw. 250-volt generator. With this unit, according to Robert Hartz, the fuel consumption is 10 gal. per shift and its cost is 70c., which amounts to 9.3 mills per ton of coal produced. As lubricating oil

Battery locomotive has left five loads at tipple and is starting back with five empties.

Robert Hartz, mine foreman, waters the battery of his 2-ton 24-in. locomotive.



Left—For this high-speed diesel generating plant the fuel-oil cost is 70c. per day. Right—This car is being dumped to the bar screen. Other cars are dumped to the shaker screen (*A*) and from it the lump is gently binned by adjustable conveyor boom (*B*).

does not exceed 10c. per day, total fuel and lubricant cost is under 1¼c. per ton. This type of engine, operating at 1,200 r.p.m., has a single-plunger low-pressure valveless fuel-metering pump supplying the cylinder injection nozzles through a distributor disk. It is equipped with automobile-type generator and starting motor operating at 24 volts, and for this starting duty four 6-volt automobile batteries are used in series.

Not counting the locomotive, the connected load supplied by the 45-kw. power plant consists of one 35-hp. mining machine, a 5-hp. fan, 3-hp. shaker screen, 5-hp. tipple conveyor, 2-hp. mine pump and ½-hp. coal-treating spray pump; total, 50½ hp. Very often 43 to 48 hp. of this connected load is on the line at one time. Obviously that leaves little capacity for a locomotive, and for that reason the latter is battery-operated. Its charging, however, is done entirely during shift so that the power plant operates only during the day. That charging is done from resistances connected to the mining-machine feed line, one station being at the drift mouth and the other at the parting in the mine. Charging is done at noon and also at odd times when there are waits during the shift.

Although built locally the locomotive has the appearance of a factory job. Its highest point is only 24 in. above the top of the rail. Both axles are geared to the driving motor and all gears run in oil-tight casings. The electric control affords three speed points forward and the same for reverse. In the drive assembly the motor is mounted between axles with its shaft parallel to the length of the locomotive. By a Diamond triple roller chain it drives a sprocket keyed to the center of a spline shaft connecting two automobile differentials in which all parts but the ring gear and pinion are removed. The former is keyed to the locomotive axle and the pinion shaft engages the spline shaft. Track gage is 39 in., the wheelbase 42 in., and the wheel diameter 16 in.

Two batteries are carried in the locomotive, a main battery for traction and a small battery for headlights. Both are Edison, the former consisting of 42 cells, Type A-6, and the latter of six cells, B-10. The electric motor and controller came from an old Baker electric brougham of pre'20 vintage. As built, the locomotive with batteries weighed 3,750 lb. To increase traction, 250 lb. of scrap iron was added soon after it was put into service.

At present the haul consists of 200 ft. of level track and 1,000 ft. of 3-percent grade (maximum) against the loads. The locomotive regularly brings out five cars, each carrying 2,100 lb. of coal. Speed upgrade with that trip is estimated to be 3 m.p.h. Tested on level track without load, the locomotive ran 7½ m.p.h.

Direct saving on haulage by locomotive is 3c. per ton. Added to that is another saving of 2 to 3c. per ton because introduction of a locomotive automatically elevated the mine to a class in which the accident record over the State is better than at the usual small truck mines. The base compensation rate (1940) per dollar of payroll for small mines is 11c., and for large mines 8½c. It so happens that the State department draws the line between classes by whether or not electric main haulage is used. Battery-locomotive operation also means savings in stock feed and work in taking care of ponies, elimination of pony shoeing, and the troubles and expense of ponies being hurt. It also saves trolley and track circuit expense and did not introduce the shock hazard of open trolley wires.

Cutting is done with an old shortwall rebuilt to include live tail rope.

Sixteen wooden mine cars, part of them with Timken and part with plain bearings, constitute the rest of the haulage units. Dumping is by a chain hoist serving two tracks, one of which dumps to a bar screen and the other to a balanced double-deck shaker. Lump from the shaker moves to a Fairfield portable stacking or loading conveyor installed in a semi-permanent manner so that the conveyor discharge end can be raised or lowered. It does the double duty of conveying the lump sidewise to a bin and acting as an adjustable boom to reduce breakage when the coal level in the bin is low.

Sizes prepared at the mine at the time this article was written were: 5/8x0-in. bugdust, 1½x5/8-in. stoker, 2x1½-in. nut, 4x2-in. egg, 4-in. lump, 2-in. lump, and 2-in. nut and slack. Coaladd liquid for dust elimination is applied from a tank and pressure pump purchased from the Coal Treating Equipment Co., of Cleveland. In addition to fixed nozzles at the chute gates, a portable hose with nozzle tip is available for manual application. Any size coal is treated.

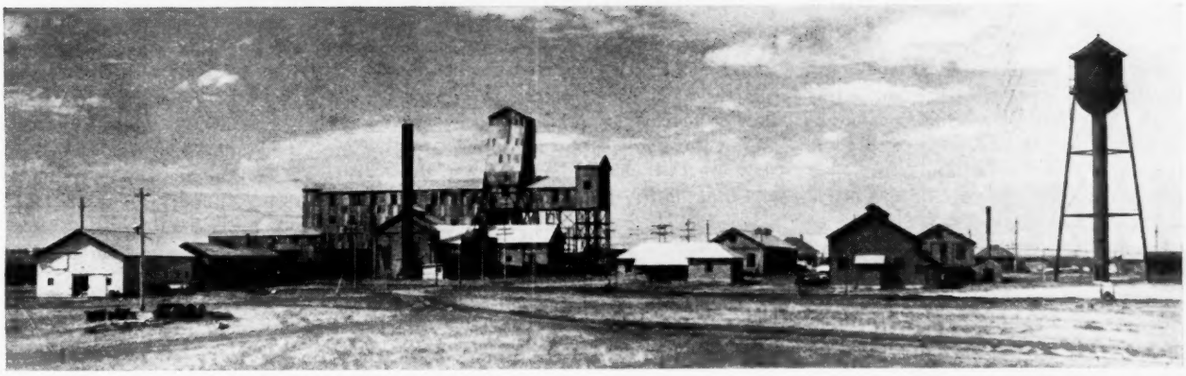
A normal crew at the mine consists of one man at the tipple and ten men underground, including the mine foreman. The men are paid the union scale, which for loaders is 78.2c. per ton. Shooting is done with King pellet powder ignited by fuse.

Average Haul Is 60 Miles

Contrary to the common practice at Ohio truck mines, the Hartz Coal Co. retails and delivers about 75 per cent of its output. Principally these deliveries are to the Akron-Cleveland vicinity. Average haul is close to 60 miles and the normal maximum haul is 80 miles. Peak demands occur in August, September, October, January and February. In the spring and early summer months, operating time is slowed to two or three days per week and during those months entries are developed for room mining during the peak months to follow. During the slack months, fine sizes move satisfactorily to industrial users but most of the lump must be stored.

For making deliveries the coal company owns three motor trucks—a 1½-ton Chevrolet, a 2-ton Dodge and a 2-ton GMC. Maximum loads of 8 tons are carried on these trucks. The coal company has the expense of maintaining a half mile of road connecting the tipple and the paved highway, State Route No. 516.

As sales helps the company uses five mailing pieces. One is a brief illustrated story of mining and preparing the Triple Heart coal. Another pamphlet, titled "You Can Put in Coal While the Wash Is on the Line," features the Coaladd spraying. A 3½x8½-in. blotter likewise features "Dustless Coal." Return permit postal cards sent out by mail or left with previous deliveries often bring orders for a mine-to-customer delivery. On the latest printed matter, a new letterhead, the Triple Heart trademark incorporates the words: Clean, Dependable and Economical. As a rule all sales are C.O.D. except that industries with a satisfactory credit rating are allowed to run accounts. Last year the total loss on bad accounts was approximately $200.



Headframe, preparation and surface plant of Lethbridge Collieries No. 8 mine at Lethbridge, Alberta, Canada.

FITTING OPERATING METHODS

To the Bed Conditions Existing In a Lignite Colliery at Lethbridge, Alta.

An outstanding lignite operation is the plant of the Lethbridge Collieries, in eastern Alberta. The regularity of the bed contours makes it possible to lay out the mine with equal regularity, though the presence of faults unpredictable as to throw, location, direction and in other ways makes operation difficult and heavy grading of roadways essential. Because of the extremely cold winters, the coal is cleaned by spirals. A stoker size is prepared for the market.

By R. DAWSON HALL
Engineering Editor, Coal Age

FLAT as the extensive plains that lie above them are the lignite beds of eastern Alberta. These level, blanket-like deposits contrast markedly with the coal seams in the Rocky Mountain region of western Alberta and eastern British Columbia. There the beds pitch so heavily that they resemble not so much beds or blankets but the narrow seams of a garment, for, sandwiched between bodies of rock, they streak up and over the surface of the ground. Thus, the two occurrences of coal exemplify well, each in its own region, the diverse origins and rationale of the two terms "coal bed" and "coal seam."

At Lethbridge, Alta., the surface of the ground is quite flat, though at one point, near Galt, No. 8 mine, of the Lethbridge Collieries, a deep ravine, or "*coulée*," breaks the monotony of the even terrain. At this property, the coal bed dips only 1.37 per cent and in a direction 8 deg. west of north. The only difficulty in operation is presented by a large number of faults which displace the seam from 1 to 18 ft. vertically and which lie in no systematic direction.

These dislocations also curve annoyingly and are sometimes normal, sometimes reversed. Each is a problem of itself. However, the mine is laid out without regard to faults and, by the aid of suitable grading, the original layout is followed regardless of obstacles.

Whereas, in the Rocky Mountain region with its Kootenay (Lower Cretaceous) measures, a number of seams often are available, here there is but one workable seam, 4 ft. 4 in. thick, which is in the Belly River formation of Upper Cretaceous age. It lies in what is known in U. S. geological parlance as the Montana group.

Both roof and floor are of shale. Though no bentonite is present, at least visibly, the floor will swell if it gets wet; so an effort is made to keep it dry. The quantity of water produced in the mine is not large—about 40,000 gal. every 24 hours. Galt No. 8 nowhere outcrops or holes into other workings.

The top of the coal at the main shaft is 365 ft. below the collar; 250 ft. of this cover is clay mixed with boulders and has little strength. Except at faults, there is little methane, but 18 ft. above the seam is a 14-in. coal rider which, when it falls, releases near the roof an inert asphyxiative gas that tends to float over the mine air. This has not been analyzed, but, because of these quali-

ties, it is believed to be nitrogen. The mines of this company, fortunately, have never been troubled by spontaneous combustion as have many lignite workings. However, in terms of the American Standards Association classification, this deposit would be classified as sub-bituminous coal rather than lignite.

Panels are made 400 ft. square to accommodate rooms 200 ft. long driven from adjacent headings so as to meet in the heart of the panel. Rooms are driven at 36-ft. centers and 27 ft. wide, thus the pillars, which formerly were never drawn, are 9 ft. thick. The bone under the coal bed is cut by Sullivan CR-8 machines, and the face is then sheared by Anderson, Boyes equipment to a depth of 6½ ft.

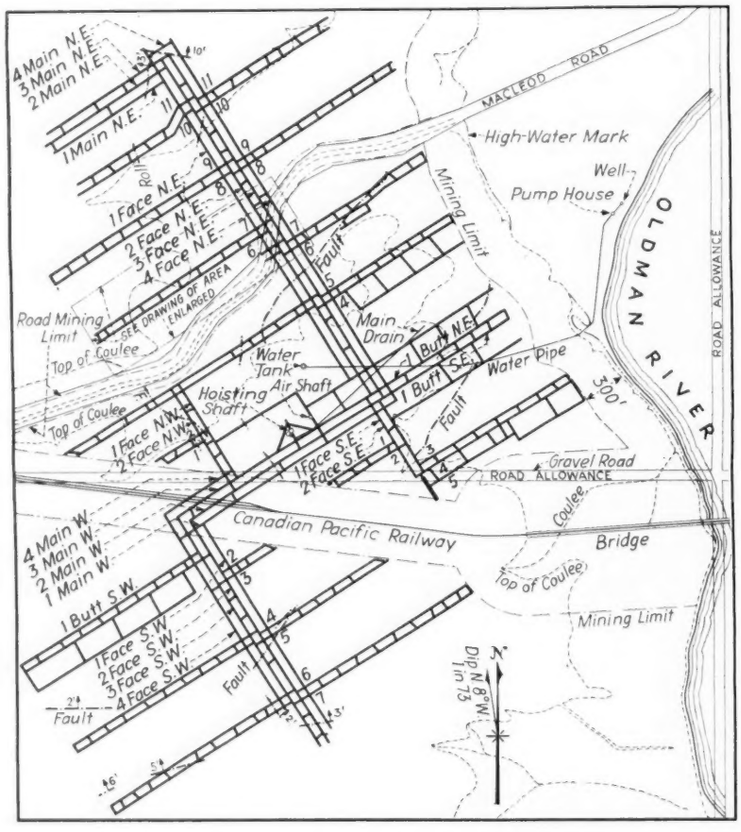
In headings, Anderson, Boyes Universal cutting and shearing machines cut and shear to a depth of 7 ft., making their vertical cuts precisely in the center of the face. The shale, bone and dirty coal is sheared for a distance of 16 in. below the main seam, so as to obtain suitable height for the roadway in shooting. Production per pick point was 1.6 tons, but tests made with points tipped with Borod reduced pick consumption 40 per cent. Studies into the desirability of using Carboloy are now being made. All coal and refuse are loaded into mine cars by man power.

Monobel No. 14 powder is used for shooting, which is done during the working shift. Headings are driven 8 ft. wide. In rooms, the track is laid on the center line, and timbers 8 ft. long are set at 2-ft. centers, with cap pieces angling 60 deg. from the face. In roadways, cross timbers are 8 ft. long supported on two inclined legs each 5 ft. 3 in. in length with 1 in. inclination for every foot of length. All cuttings in rooms, whether of bone, coal or shale, are gobbed alongside the road, but in headings they are loaded in cars and brought to the surface for disposal.

Experience has shown that, with time, the heading pillars in these and other lignite mines slab off, for the dry air cracks the lignite, making timber maintenance unduly heavy. However, the coal does not contain more than 10 per cent of moisture, and hence does not dry as much as more lignitious coals. As the mines are not deep and can therefore be opened without excessive cost; as, moreover, shafts can be sunk wherever desired and yards for railroad cars can be located anywhere; and as, in time, haulage distances underground become greater and ventilation costs increase, it is thought well to plan for a colliery life suited to these changing conditions and a haulage distance of 13,000 ft. (about 2½ miles) is regarded as a suitable limit.

For this reason, three collieries have preceded Galt No. 8, having been opened, worked and abandoned in turn by the Lethbridge concern. Each had two shafts, to wit: Nos. 1 and 2, Nos. 3 and 4, and Nos. 5 and 6. Today, shafts Nos. 7 and 8 are working, of which No. 8 is the hoisting shaft and No. 7 the airway. No. 8 has two hoisting compartments with a half compartment at each end, one for the electric cable and one for pipes. No. 7 shaft is a three-compartment shaft with two compartments for the steam hoist and the third for a stairway. Both shafts measure 12x18 ft. and are lined skin to skin with 8x10-in. British Columbia fir timbers. Wood guides of the same material are provided and cast-iron shoes.

Steel sets are used in the shaft bottom, but in the main heading and at junctions British Columbia fir is provided. In other places, jack pine and lodgepole pine suffice. No creosote or other preservative is used. Cost of timbering ran about 25c. per ton of coal mined, but by recovery of posts from rooms this cost has been reduced to 15c.



General layout of No. 8 mine showing entries and surface development with contour of plain and mining limits planned to prevent flooding of mine.

Water Enters at Floor

Some of the water entering the mine seeps in near the river but more of it is ground water that enters the workings at the floor. Six double-acting gathering pumps are used equipped with flameproof motors and starters as approved by the Safety-in-Mines Research Board of Great Britain at its Buxton station in England. A centrifugal pump lifts the water from the main sump. All the units were constructed by Pumps and Power, Vancouver, B. C. Though the water is slightly acid, black iron pipe can be and is used below ground and cast-iron pipe at the surface.

Ventilation is afforded by a Thermotank torpedo twelve-blade screw force fan, manufactured at Glasgow, Scotland, and, without adding stages, capable of delivering 150,000 cu.ft. of air per minute against a 4½-in. water gage. It is now circulating 96,000

cu.ft. of air per minute against a 2½-in. water gage. At present, it is a single-stage fan, but an additional stage can be added if and when needed. The fan is driven by a Westinghouse motor through a 5-belt V-drive. Airways measure 6½x8 ft. exteriorly and 6½x7 ft. inside timber.

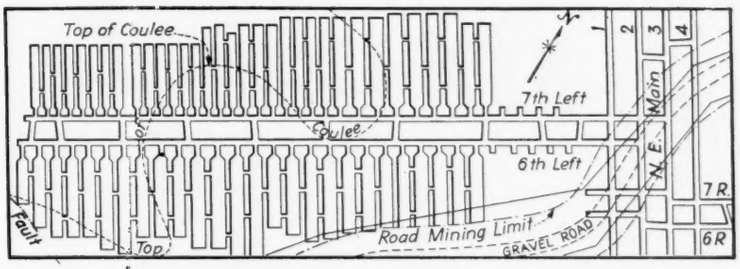
In development, headings are ventilated near the face by Meco blowers; crosscuts are driven at 400-ft. centers. Several kinds of duct are used—Dominion Rubber tubing, Industries, Ltd., Ventube, and a Scottish type known as Cellahose. The diameter of these pipes varies from 10 to 12 in. Two fan units deliver 5,000 cu.ft. of air per minute through 1,000 ft. of 10-in. hose and two others 2,500 cu.ft. of air per minute through an equal hose length. One of the two larger units is ventilating the ends of the four headings comprising a face entry. The smaller units are used to ventilate the two headings of butt entries.

A.C. Power for Cutters

Cutting machines are actuated by 220-volt a.c. power which is taken into the mine through boreholes. Main haulage is by endless under-rope using Smallman clips. Separate roads are used for empties and loads. Development and subsidiary haulage is by horses.

Coal is hoisted by a 500-hp. 2,200-volt a.c. Canadian Ingersoll-Rand unit which accelerates from 0 to 1,850 ft. per minute in 7 seconds. One car is hoisted at a time; hoist takes 28 to 29 seconds including not only hoisting but car-changing time. The drum is of spiral cylindrical type and has 6- and 9-ft. diameters. A Lilly control regulates the hoist against overspeed and overwinding.

Because of the extremely cold winters, the coal is cleaned by spiralizers, and even these need care in the winter to keep them from freezing. Every effort is made to maintain a temperature of 60 deg. F. For hoisting and preparation an all-steel headframe and tipple with wood floors is provided. Empty cars are pushed onto the cage with electric pushers, and the loads are ejected in the same manner. Electric pushers also put the loaded cars onto a Link-Belt rotary dump. This starts its revolution at a slow speed but in revolving strikes a cam that accelerates it. Further revolution puts in operation another cam which decelerates the speed and on further movement actuates a Thrustor which stops the revolution with the dump in position to receive another car.



Room development in 5th and 7th lefts, typical of operating methods in other entries. Now, pillars are being drawn, bottlenecked rooms may give way to rooms widened only on one side.

The coal then passes over a ¾-in. bar screen onto a weigh pan, where it is weighed and passed to a primary shaking screen, where 0x1⅛-in. and 1⅛x4-in. coal are removed. All plus 4-in. coal passes over two picking belts, where refuse is eliminated, and then traverses a shaking screen to remove degradation. It is loaded into box cars by Manierre loaders.

The intermediate size, 1⅛x4-in. coal, is elevated to the top of the spiral house, where it descends by five spirals making a separation between clean coal, middlings and refuse. The middlings are elevated once more and passed over a special spiral which discharges clean coal and refuse. All coal from the bank of spirals discharges onto a picking table, where it is finally picked by hand and then passed over a shaker degradation screen to remove breakage. Thence it passes to box cars where it is loaded by portable Ottumwa loaders.

From the primary shaker 0x1⅛-in. coal is taken and elevated to the upper end of the secondary shaker, where a Hendricks screen removes ⅝x1⅛-in. stoker coal. Minus ⅝-in. coal passes through the screen and into a slack bin and thence to railroad cars. Flight conveyors elevate the stoker coal to the top of the spiral house, where that size is passed over four spirals, discharging clean coal and refuse. The clean coal is passed over a fine screen to remove dust, after which it is loaded into box cars by an Ottumwa portable loader.

All coal from the degradation screens, regardless of size, is collected and taken to the upper end of the secondary screen. Refuse both from hand picking on the belts and from cleaning on the spirals is elevated and deposited in a 20-ton rock bin. Rock hoisted from the mine is diverted at the rotary dump so that it passes to a rock bin of 50-ton capacity. Both these are discharged into special dump cars and hauled by a main-and-tail rope haulage to a rock dump in the *coulée*, 1,500 ft. from the mine. All box cars are switched and weighed by the coal company's own employees and delivered to the Canadian Pacific Ry.

Water for industrial purposes, locomotives, the bath house, fire fighting, etc., is drawn from a well. A 150-g.p.m. Ingersoll-Rand pump with Honeywell control having mercury switches lifts the water 425 ft. to the top of a 40,000-gal. supply tank. This is controlled so delicately that a fall of 2 ft. in the elevation of the top of the water in the tank automatically will set the pump working.

This control has been in operation three years and has never failed to work satisfactorily; nevertheless, provision has been made that, should the pump fail for a few seconds, the control will ring an alarm, but, should the pump later go into action, the control will silence the bell. Tests have been made at intervals to ascertain that if the pump should fail, the alarm will be sounded and that a reestablishment of pumping service will stop the alarm. This has been done by preventing temporarily the proper functioning of the pump.

Ready for Flood Water

A 100-gal. tank float control located in the pumphouse assures the positive priming of the pump. Both pumphouse and well are buried in the ground so that, even if water should flow over them, they will not cease to function. The tank stands 90 ft. above the surrounding plain. A 6-in. hydrant service is provided around the mine buildings. Water from the mine normally passes to the river, but it can be pumped into the tank, if needed for fire-fighting purposes.

The hoist and preparation plant at Galt No. 8 works a single shift, but there are two loading and two cutting shifts. Output per 24 hours when operating is 1,600 tons. B. T. Coon is general manager and J. M. Davidson is mine superintendent.

NEW LIGHT ON OLD QUESTIONS

Arrangements Should Be Available to Convert Mine Excavations Into Safety Chambers *

By DENNIS J. KEENAN
State Mine Inspector, Barnesboro, Pa.

MANY LIVES could have been saved after mine fires and explosions if men had found material with which to erect barricades and had known how and where to build them. Some have been fortunate enough not only to find such material but to make effective use of it, and their lives accordingly have been spared. But protection of this kind should not be left to chance and materials should be provided that normally would not be found in the workings.

Too often, the men trapped by such a catastrophe become so confused and distracted that they cannot analyze the situation and in consequence they make a mistake, with disastrous results. If the barricading scheme has not been planned previously, decisions may have to be made, and for the lack of a leader there may be cross purposes. When an emergency arises, many excited suggestions are offered and chaos results.

Much can be done to save human life (1) by providing the barricade before the danger occurs; (2) by constructing the barricade in such a manner that it can be maintained in or adjacent to all active entries and can be put in, at least, partial operation almost instantaneously as soon as men reach the site of the barricade; (3) by equipping all such safety chambers with a tank or tanks holding 110 cu.ft. of oxygen for every man employed in the entry; (4) by having officials give brief and clear instructions as to the manner in which the barricades are to be closed, how cracks are to be sealed and how the oxygen should be released so as to meet the needs of the men in the barricade and yet preserve the supply; (5) by equipping all barricades with enough material and tools that any stoppings knocked out by concussion may be replaced; (6) by planning the safety chamber to suit the method of mining; (7) by maintaining the barricade at all times within 600 ft. of the end of the entry; (8) by regarding the barricade as part of the mining layout to be as carefully planned as are the locations and shapes of rooms, entries and other excavations; (9) by maintaining and keeping the safety chambers equipped at all times.

Barricades usually should be located in back headings where no rooms are being turned and two incombustible doors should be erected therein at distances so far apart as to give ample area to supply all the air the men in the entry will need for at least 24 hours (Fig. 1). However, in some cases, such as where mother conveyor belts are installed (Fig. 2), a safety chamber could be provided by driving two rooms about 200 ft. with two crosscuts and a door on each room neck, these rooms to be driven off that heading from which, on the advance, rooms are not being turned. These safety chambers should be about 600 ft. apart. Barricade equipment in both instances could be advanced as the entry progresses and could be used again on the retreat.

Where the safety chamber is located in the back heading, the outby door would have to be moved forward only when the active workings have advanced 600 ft. and, in retreat, the inby door could be removed to its original location. Enough oxygen should be kept in all barricades to insure life for at least 24 to 36 hours. Material and tools should be kept in a locked box, and drinking water in charcoal-lined containers. A small supply of liquid canned food also should be provided.

The material should consist of lumber (cut, as nearly as can be arranged, to the width of the crosscuts) with brattice cloth, hammer, axe, sledge, trowel, nails and plastic cement so that cracks in the door and at its sides, top and bottom could be sealed. The safety chamber should be equipped with a small hand-powered fan to clean out the barricade in case the air in the section of the heading to be barricaded is contaminated before the doors are closed. When closed the fan would withdraw air which could be replaced either by releasing oxygen from the oxygen tank or compressed air from a similar container.

According to the U. S. Bureau of Mines, 1 cu.yd. of normal air will provide a man for one hour with the oxygen necessary for breathing, so with a 4-ft. seam and with a 12-ft. airway, 600 ft. long, which will afford

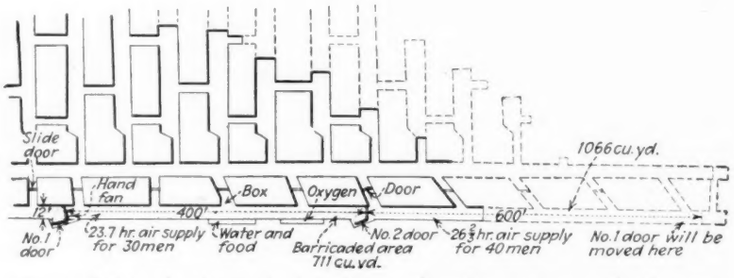


Fig. 1—Safety chamber in back heading with replacement as work advances.

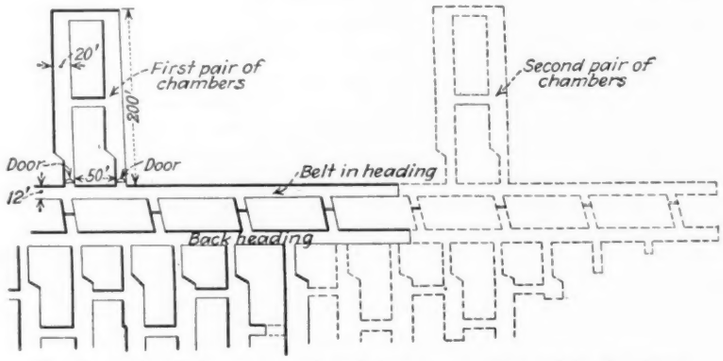


Fig. 2—As headings are encumbered, two rooms act as safety chambers.

*Article on "Barricades" read before the Mining Institute of the Fifteenth Bituminous District of Pennsylvania, Barnesboro, Pa., Nov. 23, 1940.

1,066 cu.yd. of air, 40 men will receive all the air they will need for 26⅔ hours; 400 ft. of barricaded heading would afford 711 cu.yd. of air or, with 30 men, enough for 23.7 hours, and in each case the tank oxygen would extend the protection still further. The doors could be sunk in the ribs so that the violence of an explosion would not dislodge them and so that they would not be mishandled when not in use.

A safety chamber would be the best insurance, the best cost reducer and the best confidence maker and the best effort and life saver the coal industry could contribute to gassy mines. My plan may not be the best that can be perfected but it may serve as a basis for something even more adequate. The late Pennsylvania Secretary of Mines, J. I. Thomas, April 1, 1940, suggested that several coal companies be asked to experiment with the plan and thus accumulate actual cost data, and in this the present Secretary, Richard Maize, also concurs.

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What Size of Timber Should Be Used to Support Roof?

ABOVE every coal seam is a body of rock which has been termed the "immediate roof." It falls as soon as the adjacent pillars are drawn and, therefore, some time prior to the major break, which will not occur until more of the pillars protecting the roof have been removed.

In any mine, the thickness of this roof measure may vary, but it is well to assume it large enough to assure against the possibility of an underestimate. Near the outcrop, all the rock over the coal probably will be included in this immediate roof, and in some cases this roof may even take in another coal seam and the weak roof measures above it, as in the illustration.

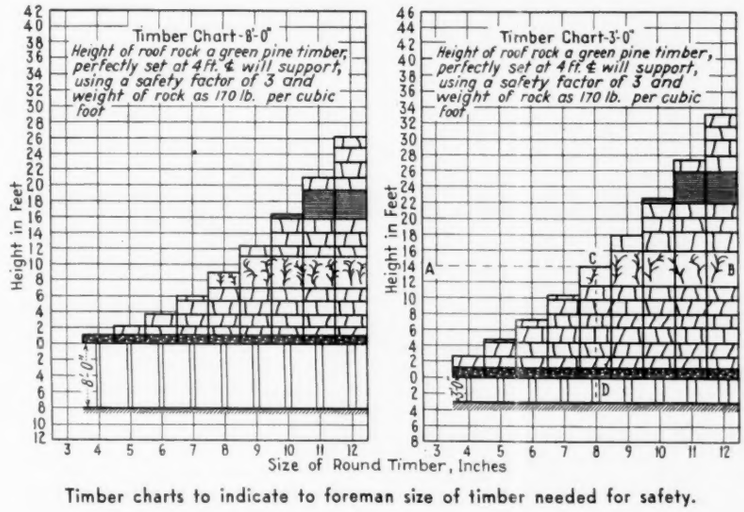
Information as to the support a post of a given diameter will give is of value in enabling the foreman to choose the correct diameter of the post to use in any given location. The drawings shown are samples of those prepared by H. M. Johnstone, superintendent of coal mines, Republic Steel Corporation, Sayreton, Ala., with J. W. Nichol, then safety engineer of the company and now mine superintendent, Alta Coal Co., Sumiton, Ala.

Other articles in this issue that should be read by foremen are one by J. H. Dickerson on mine ventilation, p. 44; an account of the extinguishment of a mine fire by carbon dioxide, p. 59; a description of the use of greasing machines for the lubrication of loaders, p. 51; an explanation of the methods of handling heavy partings, p. 39; and of the holding of heavy drawslate in place while loading with conveyors, p. 47. With these suggestions the foreman should be enabled to increase his power to handle the difficulties incident to his job.

Drawings such as these are posted at the mines of those companies to indicate the sizes to be used for the protection of the miners, though some of them have been prepared for seams much thinner than can be found, or are likely to be found, at Sayreton. They have been drawn for 3 ft., 4 ft., 5 ft., 6 ft., 6 ft. 6 in., 7 ft., 7 ft. 6 in. and 8 ft., all for green pine timber of circular cross-section when set at 4-ft. centers. Of these several charts, two have been reproduced, one for a 3-ft. and one for an 8-ft. seam.

The available strength of the timber has been assumed as one-third of its breaking strength, and the weight of the roof rock has been figured at 170 lb. per cubic foot. Because of the support afforded by the pillars, the actual safety factor will be greater than three, but there is no disposition to skimp on timbering. With thicker roof, the largest size of timber given may be used, as such thick cover will arch itself between pillars and will not come down until the pillars are removed. The seam being mined at Sayreton is the Mary Lee, with the Newcastle seam about 40 ft. above it.

A different chart would have to be developed for each kind of timber used and for the several distances between prop centers. To use the chart for the 3-ft. seam, the foreman ascertains from the map the depth of the cover—say 14 ft.—and passes his eye over along the line *AB*, which is drawn so as to cut that figure on the left of the chart and finds that at *C* it is just above the part of the illustration in which, near the base line, is shown an 8-in.-diameter round timber, *D*, which accordingly gives the size of the timber that is recommended for use by these authorities for the support of the roof. On the other hand, the cover may be 200 or 300 ft., but he will assume in this case that the cover is only 32½ ft., the thickness of the immediate roof for which a 12-in.-diameter round timber is indicated.


Timber Chart-8'-0"
Height of roof rock a green pine timber, perfectly set at 4 ft. ℄ will support, using a safety factor of 3 and weight of rock as 170 lb. per cubic foot
Height in Feet
8'-0"
Timber Chart-3'-0"
Height of roof rock a green pine timber, perfectly set at 4 ft. ℄ will support, using a safety factor of 3 and weight of rock as 170 lb. per cubic foot
A
B
C
D
3'-0"
Size of Round Timber, Inches

Timber charts to indicate to foreman size of timber needed for safety.

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Just What Is Firedamp— An Atmosphere or Methane?

Strictly speaking, a "damp" is a surface atmosphere after it has been modified by its entrance and by its temporary or extended stay underground in a mine or natural cave where gases have been added or subtracted, sometimes with the aid of fire, persons, animals, explosives, locomotives or timber. It is a mixture of gases rather than a single gas. Thus, it has a varied rather than a definite composition. Its specific gravity also is variable.

When the early miner talked of firedamp, he meant any mine atmosphere that flared, burned or exploded when a light was introduced into it, so "firedamp" should be regarded as a natural highly combustible mixture of mine gases and, if we restrict ourselves to the period of time when the use of the word arose and when mines almost never contained hydrogen, we may add it should contain methane in such proportion, in relation to the several gases which sustain or restrict its combustion, that it will flare, burn or explode when exposed to an open light.

But, of late, some people have been regarding methane, which is the active agent in firedamp, as "firedamp" itself. Thus, as they see it, "firedamp" need not be a mixture at all, and as, moreover, pure methane is not explosive, and becomes explosive only when air is added, this definition contradicts that requiring that an atmosphere is "firedamp" only when it is capable of being exploded or caused to flare.

An atmosphere containing too much or too little methane will not explode. If air and methane are mixed so that there is more than 5 per cent of methane and less than 15 per cent, the mixture is explosive. These figures should be remembered, for earlier determinations arrived at different results, and are still quoted as authoritative.

It used to be said that short of a content of 7.14 per cent, methane would not explode, but the figure should be 5, not 7.14. Closer studies have revised the latter figure, according to the U. S. Bureau of Mines, I.C. 6983. However, the air must not have an excess of nitrogen or carbon dioxide or be short of oxygen if this figure is to hold.

There may be many gases in firedamp—few of which are essential components of it. These are moisture, carbon dioxide, carbon monoxide, hydric sulphide, hydrogen, oxides of nitrogen and sulphur, and the "noble gases," so-called, usually found with nitrogen: namely, argon, helium, neon, krypton and xenon.

QUESTIONS ASKED BY STATE BOARDS

Questions, First Class Mine Managers' Examination, Illinois, 1940*

Weight of Air

Q.—With a temperature of 32 deg. F., what is the weight of a cubic foot of air when the barometer reads 29.2 in.?

A.—Substituting the given values in the formula $\frac{1.32534 \times B}{460 + t}$ where B = barometer reading in inches and t = temperature in degrees Fahrenheit, the required weight of 1 cu.ft. of air at this temperature and pressure is $\frac{1.32534 \times 29.2}{459.4 + 32} = 0.07875 +$ lb.

Mine Gases

Q.—Explain the symbols CH_4, CO_2, SH_2, and what are the comparative weights of the gases they represent?

A.—Symbol CH_4 represents one molecule of methane. A molecule of this gas consists of one atom of carbon (atomic weight 12) chemically united with four atoms of hydrogen (atomic weight 1.008). The one atom of carbon is represented by the symbol *C*, and the four atoms of hydrogen by the symbol H_4, the number of atoms being indicated by the small subscript figure following the symbol; absence of a number indicates a single atom only.

Symbol CO_2 represents one molecule of carbon dioxide. A molecule of this gas consists of one atom of carbon chemically united to two atoms of oxygen (atomic weight 16). One atom of carbon is represented by the symbol *C*, and two of oxygen by the symbol O_2.

Symbol SH_2, or, as it is more usually written, H_2S, stands for hydrogen sulphide. A molecule of this gas consists of two atoms of hydrogen chemically united with one atom of sulphur (atomic weight 32.064), the symbol of sulphur being *S*. The molecular or comparative weights of these gases are obtained by adding together the atomic weights of the atoms forming each molecule; thus,

$CH_4 = C + 4H = 12 + (4 \times 1.008) = 16.032$

$CO_2 = C + 2O = 12 + (2 \times 16) = 44$

$H_2S = 2H + S = (2 \times 1) + 32.064 = 34.064$

(Authority for atomic weights is T. W. Richards, Encyclopaedia Britannica, 14th Edition.)

The atomic weight of sulphur was formerly given as 32, in the belief that all atomic weights should be whole numbers, though it was found fractionally more than that figure. It is now found that the element sulphur contains three substances of identical chemical properties and like position in the periodic table of elements, known as isotopes. About 95 per cent of the sulphur has an atomic weight of 32, about 4 per cent has an atomic weight of 34, and about 1 per cent has an atomic weight of 33. But, as will be seen, this does not agree closely with the figure just given.

Calculating the average atomic weight of the three isotopes of sulphur:

0.95x32 = 30.40
0.04x34 = 1.36
0.01x33 = 0.33

32.09 as against 32.064.

The existence of two isotopes of hydrogen explains why its atomic weight is found to be 1.00778 (to quote F. W. Aston, Ency. Brit. 14th ed., Vol. 12, p. 729) instead of 1.00000.

Diffusion of Gases

Q.—State the law of diffusion of gases and explain its effect on their behavior. Give rule and example showing how to find the comparative velocity of diffusion of different gases.

A.—The velocity with which gases diffuse into each other varies inversely as the square roots of their densities. For example, the density, or atomic weight, of hydrogen being 1.008 and that of oxygen 16, the velocities of the diffusion of these two gases into each other will be inversely as the square roots of 1.008 and 16; that is, the velocity of diffusion of hydrogen will be to that of oxygen as $\sqrt{16} : \sqrt{1.008}$ or as 4:1.004 or as 3.984:1. In other words, the velocity with which hydrogen will diffuse into an atmosphere of oxygen is about four times the velocity with which oxygen will diffuse into hydrogen. The specific gravity of methane being 0.5543 (see Bureau of Mines I.C. 6983), referred to air as 1, the relative ratio of diffusion of methane and air are as $\sqrt{1} : \sqrt{0.5543}$ or as 1:0.7445; that is to say 1,000 volumes of methane will diffuse into air in the same time as 744.5 volumes of air will diffuse into methane.

Methane Calculations

Q.—Suppose that in a gassy mine, 175,000 cu.ft. of air as measured in the return is delivered per minute and that this air contains 4 per cent of methane, or 1 cu.ft. of methane in 25 cu.ft. of the mixture, when the barometer is 30. (1) What quantity of methane is given off in the mine? (2) What is the least decrease in the quantity of air that will render the return air explosive? (3) What increase of methane will render the return air explosive?

A.—(1) The quantity of methane given off in the mine is 175,000 × 0.04 = 7,000 cu.ft. per minute.

(2) Assuming that the explosive limit is reached when the proportion of methane to air is 1:19, or when the percentage of methane is 5 per cent (see Bureau of Mines, I.C. 6983, p. 5), this is enough to render 19 × 7,000 cu.ft. of air per minute explosive, or 133,000 cu.ft. As the quantity of air entering the mine is 175,000 — 7,000, or 168,000 cu.ft. per minute, the decrease of air in the intake required to bring the air up to the lower explosive limit would be 168,000 — 133,000 = 35,000 cu.ft. Hence, if the circulation in the intake is decreased from 168,000 to 133,000 cu.ft. per minute, or, in other words, if there is a reduction of 35,000 cu.ft. per minute in the air entering the mine, the return current will become explosive.

(3) The quantity of gas necessary to cause the intake current to reach the explosive limit is 168,000 × 0.05 = 8,400 cu.ft. per minute, and the required increase in the flow of methane into the mine to render the methane explosive is therefore 8,400 — 7,000 = 1,400 cu.ft. per minute.

Examination Questions, Steam Hoisting Engineers Illinois, 1940*

Strength of Joints

Q.—How strong are riveted joints in boilers as compared with the strength of boiler plates?

A.—Strength of such joints depends on type of joint and exactitude with which plate and rivets are duly stressed in proportion to strength of the two materials in tension, compression and shear. This depends for any type of joint, on number, size and spacing of rivets. Joints are of several types: single-, double-, and triple-riveted lap joints; single-, double-, triple-, and quadruple-riveted butt joints.

* Continued from p. 97, February, 1941, *Coal Age*.

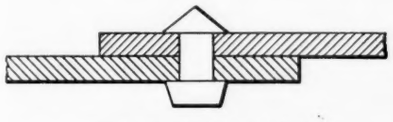
* Continued from p. 97, February, 1941, *Coal Age*.

A lap joint is where one edge of the curved shell, or plate, extends or laps over the edge of the other or over the edge of another plate and where one, two or three rows of rivets are driven through concentric holes in the overlap and secured tightly by hammering, so as to join the plates together. A butt joint is where the edges of the plate or plates merely abut and one strap is laid over, and one below, the joint with concentric holes in the three plates through which rows of rivets are driven and secured tightly so as to join them together.

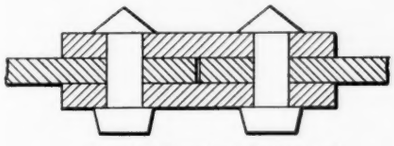
STRENGTH OF JOINTS AS PERCENTAGE OF SOLID PLATES

Joint	Per Cent
Single-riveted lap	65.6
Double-riveted lap	72.5
Triple-riveted tap	76.5
Triple-riveted butt	85.7

These figures, however, are true only for particular examples. Pitch of rivets and diameter enter into the problem and these again depend on strength of the material used for rivets and plate respectively.



Single-Riveted Lap-Joint



Single-Riveted Butt Joint

Cross-sections of double riveted lap and butt joints.

Capacity of Engine

Q.—(a) Compute the horsepower of an 18x36-in. steam engine operating under a steam pressure of 100 lb. per square inch.

(b) What weight can be lifted by this engine with an 18-in. crank on the shaft of a 6-ft. drum?

(c) With the same length of crank and a 12-in. spur wheel, or pinion, geared to a 6-ft. drum, what weight will the engine lift?

A.—(a) Nothing is said here to inform the examinee whether the steam engine is condensing or non-condensing, double-acting or single-acting; whether the steam enters the cylinder during the entire stroke or up to a certain point of cut off and how many strokes are made per minute; hence, it will be assumed that the engine is non-condensing, and double-acting, makes 250 revolutions, or 500 strokes, per minute and that the steam-gage pressure is 100 lb. per square inch for the entire stroke.

Foot-pounds of work = *plan*

where p is the pressure per square inch (100), l is the length of the stroke in feet (3), a is the area of the piston (18x18x 0.7854) and n is the number of working strokes (500).

Foot pounds of work = *plan* = 100x3x18x 18x0.7854x500 = 38,170,440.

As there is 33,000 ft.-lb. in a horsepower, divide by that figure. The result is 1,157 hp.

(b) Pressure on piston = 18x18x0.7854x 100 = 25,447.

The engine has only an 18-in. crank; so its leverage is only one-half as great as that of the rope on a 6-ft. drum, the radius of which is 3 ft. Hence the lifting ability of the drum will be half the turning ability of the crank, for the lifting ability of the drum x 3 ft. must equal the turning ability of the crank x 1.5 ft. So the lifting ability of the drum will be 12,723 lb.

$$12{,}723 \times 3 = 25{,}447 \times 1.5$$

Only at the point in the stroke when the connecting rod and crank are at right angles is this true. At the dead centers there is no leverage, but after the hoist is started, inertia will keep the load moving if the load to be lifted is reasonably below 12,000 lb.

(c) Radius of the spur gear being 6 in., the leverage on the pitch line of the spur gear is three times as much as the turning ability of the crank, which is 1.5 ft. long, hence the driving force on that spur wheel is 25,447 lb.x3 = 76,341 lb. The periphery of the drum and hence the rope will travel at the same speed as the spur gear and therefore will lift as much. So the spur gear helps with the load by slowing down the lifting speed proportionately.

Mine Foremen's Examination, Iowa, June 11-12, 1940*

Effect of Timber

Q.—What effect will timber in a roadway have in the ventilation of a mine and in what part of the airway will it last longest and why?

A.—Timber in a roadway makes the air turbulent—that is, disturbs it. Normally the pressure of the air is lower the further it travels along the roadway, but, when it passes an obstruction, the air to the outby and alongside the obstruction loses speed by collision, compression and friction, and some of its velocity energy becomes converted into pressure so that the air on either side of the obstruction is at a higher pressure than that in behind the obstruction.

Consequently, the air which has just passed such an interfering object, being resisted by the air in front of it and finding a lower pressure behind it, whirls back toward that depression, setting up a vortex. Side timbers also deflect the air across the passage of other air and cause turbulence and where air enters a nest of timber supporting roof above timber sets, the air is so turbulent it scarcely moves forward at all.

When the same volume of air is compelled to travel through the heading as before timbering, the resistance of a heading with split timber sets (a cap and two legs) is 6.5 times as great as the same heading untimbered. Part of the resistance is due to the greater speed of the air made necessary by the lessened cross-section and part to the roughness of the timber. With center posts on 5-ft. centers the resistance will be about 3.3 times the resistance of the untimbered roadway (Coal Mine Ventilation Factors, U. S. Bureau of Mines, Bull. 285, p. 45 and 50). However, if the airway is allowed to cave or partly cave, its resistance will be still greater.

Timber will last longer where air is cool, dry and free from carbon dioxide, for fungus will grow most rapidly where moisture and blackdamp occur. Air in standing rooms causes timber to rot because, as the places are poorly ventilated, they soon develop much heat and carbon dioxide, in all probability mostly from the presence of rotting timber. For similar reasons, timber in return air rots sooner than in intake air.

Mine Gases

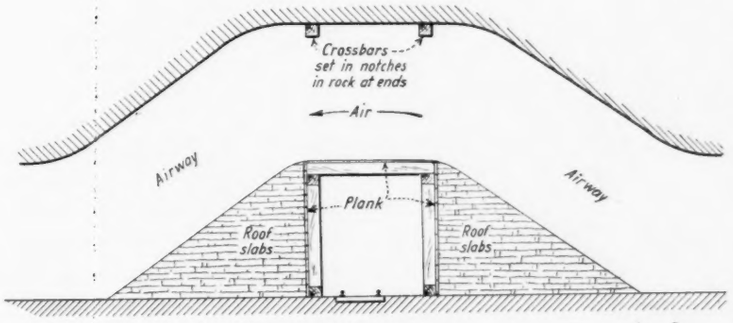
Q.—Name a gas commonly found in mines and which is heavier than air, also one that is lighter than air.

A.—Carbon dioxide, which is heavier than air, is found in quantity in most mines, especially those of high-volatile and high-moisture content. Methane, which is lighter than air, also may be found to some degree in all or most coal mines.

Ventilation

Q.—Sketch a common form of overcast. How much air would pass through it if it is 6 ft. high and 8 ft. wide and if the velocity were 600 ft. per minute?

A.—The cross-sectional area over the overcast is 6x8 ft. = 48 sq. ft. Current speed being 600 ft. per minute, the air passing would be 48x600 = 28,800 cu.ft. per minute, for in a minute a column of air 600 ft. long will pass over the overcast.



Usual form of overcast.

* Continued from p. 96, February, 1941, *Coal Age*.

In these days . . .

would you try a twist drill with 50% longer life?

Surely in these critical days you would try a different drill if you could be sure it would last 25% or even 10% longer. And you would apply the same logic to wire rope if you knew that there is really a difference in ropes. There is, and the name of the rope to ask for is

HAZARD LAY-SET *Preformed*

In comparison with non-preformed ropes, LAY-SET Preformed often makes astonishing records.

In the first place, it *lasts longer* because of its extreme resistance to fatigue. That eliminates frequent shutdowns for replacement, thus saving priceless time. This means faster and more consistent production.

In the second place, it is *easier and safer for workmen* to handle. It is disinclined to kink. It's relaxed and tractable like a well-trained saddle horse as compared with a bucking bronco.

These characteristics are preformed into LAY-SET Wire Rope at the mill, and they account for its ability to withstand hard work for a longer time at a lower cost—and with greater safety to men and equipment.

See for yourself by ordering Hazard LAY-SET Preformed Green Strand and keeping a comparative record of its performance. All Hazard ropes identified by the Green Strand are made of Improved Plow Steel.

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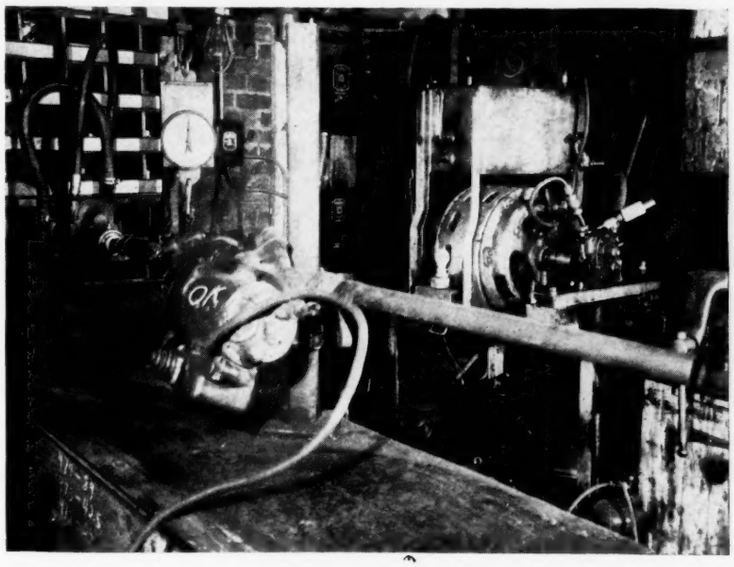
WHAT'S NEW IN OPERATING IDEAS

Pump Used as Drill Tester; Pump-Testing Oil Heated

Repaired coal drills at Kings mine, Princeton Mining Co., Princeton, Ind., are tested to see if they develop the proper torque by means of a pump-type tester developed by George Ploch, top electrician. The essential item in the tester is a Joy 5BU pump set in pedestal bearings. To test a drill, it is set on a short post and connected to the pump shaft. When the drill is started, rotation of the pump elements tends to twist the pump casing, from which an arm 1 ft. long extends out to a spring scale. Throttling the flow of the recirculated oil by means of a valve increases the load on the drill and consequently increases the twist of the pump casing up to the maximum reading, which is taken directly off the scale dial and can be read as foot-pounds, as the arm length is 1 ft.

With this tester, the reading should be 89 ft.-lb. when a No. 474 drill is developing its maximum horsepower, meaning that it is pulling 30 amp. at 150 r.p.m. Readings for 472 and 473 drills are in proportion. At present, it is assumed that the drill is developing its rated horsepower and speed when the scale registers 89 ft.-lb. (474 drill). An ammeter and tachometer, however, will be added to the unit so that a definite check will be available.

Oil pumps for loading machines also are tested in the same room, and Kings mine follows the practice of heating the testing oil to make sure that the pump is tested under the same conditions as are encountered in service. The oil temperature is raised to 200 deg. F. by means of General Electric immersion heaters in the storage reservoir which supplies the pump on test. Test pressures, depending upon the type of pump, normally range from 900 to 1,600 lb. per square inch.



Showing a coal drill in testing position. At the right is the oil-pump tester, complete with oil reservoir and immersion heaters.

•

Jiffy Resistor Lug Helps In Maintenance Work

The resistor lug shown in the accompanying illustration has many advantages over the ordinary type, declares P. C. Ziemke, Milwaukee, Wis. As it is made of copper, it has good conductive properties compared with cast iron or sheet steel. It also is much thinner, which greatly facilitates building up resistor sections by eliminating at least half the mica washers required on the mica tube opposite the lug.

When the regular lugs fail, this copper lug can be cut open easily and slipped in to replace them without dismantling the resistor section. This same feature permits quick interchange of resistors of different construction from the regular units by inserting the thin lugs at the proper resistance values.

"The wire leads are speedily attached to this lug by means of a brass bolt and washers. While some corrosion may occur on the bolt threads, due to acid mine water, air and heat, the nut usually can be turned without a twisting strain on the lug or mica tube by the use of two wrenches. In obstinate cases, the brass bolt is quickly cut off with a bolt cutter or hack saw." The lugs may be purchased or made in the shop during slack times from odds and ends of copper sheeting.

This lug facilitates repairs to resistors.

•

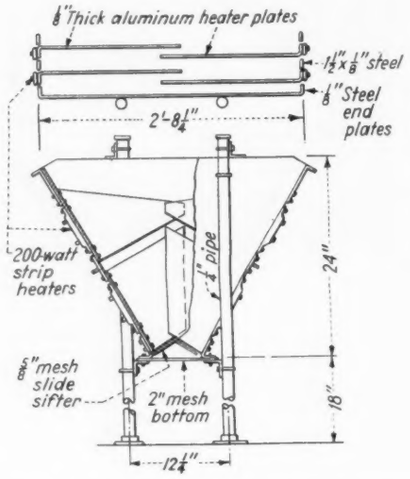
Electric Sand Dryer for Mines Uses Aluminum Elements

"The supply of locomotive sand is one of the regular items of expense which, if not given sufficient attention, may be a burden on the mine cost sheet," says C. H. Matthews, electrical and mechanical engineer, Susquehanna Collieries Co., Nanticoke, Pa., in submitting a description of an electric dryer utilizing aluminum elements. "To prevent reabsorption of moisture, sand should be used as soon as it is dried. Therefore, the dryers should be located near the place of consumption, which is at the side of the haulageways inside the mine.

"Electric sand dryers, if of efficient design, meet all requirements as to economy of operation, portability and automatic operation. The Susquehanna Collieries Co. has in service two very effective electric sand dryers designed by the writer. The efficiency of this particular design of sand dryer is based on the heat-conducting properties of aluminum. It is well known that when heat is applied to any part of a plate of such material as copper or aluminum the heat will extend quickly over the entire plate.

"General construction of the sand dryer is shown in the accompanying sketch. It consists of two steel ends between which alternate strips of steel and aluminum heater plates are supported by angles extending the assembly any length desired. The steel filler strips are $1\frac{1}{2}$ in. wide and one edge of the aluminum plates is bent $1\frac{1}{2}$ in. at right angles. The mounting bolts are on $1\frac{9}{16}$-in. centers to allow for heat expansion.

"One 200-watt electric strip heater is bolted to each of the aluminum heater plates. Since a negligible surface of the aluminum is exposed to the outside air, radiation of practically all of the heat is utilized in drying the sand. Suitable pipes support the assembly and horizontal angles across the top protect the aluminum plates from damage by a shovel when filling the dryer. No damage would result, however, if some of the aluminum plates were bent, but this might affect the rate of drying, depending upon the extent of plate distortion. When the sand is quite wet, it is necessary, after filling the dryer, to use a small rod to make vents in the sand between the aluminum plates. This



Details of electric sand dryer using aluminum heating elements.

permits generated steam to escape and thus reduces the drying time.

"Each of the dryers in service contains 44 200-watt heaters aggregating 8.8 kw. which, upon test, dried over 3,500 lb. of wet sand in eight hours. The heaters are arranged for parallel operation on a 115/230-volt lighting circuit, but by suitable switches they also may be connected in series or series-parallel as desired. Since the sand dryers are located at easily accessible places on the haulageways, control is manual. But, where necessary, time clocks may be used if the saving in power would warrant the expenditure."

•

Emergency Heater for Water Tank Made From Strip Units

When the regular immersion units used in summer, when the furnace is inoperative, failed after long service, a hot-water tank supplying a first-aid station was equipped with emergency electric-heating equipment incorporating strip-type units, writes P. C. Ziemke, Milwaukee, Wis. Four Cutler-Hammer 115-volt 550-watt strip heaters were heated with a gas torch and bent to the shape of the storage tank. Then, after the lagging was removed, these units were bolted to measured sections of perforated strap and clamped snugly to the tank.

Flameproof No. 12 stranded wire made up in cable form was used to tie the heating units to the switch and the lagging was replaced, leaving recesses for the binding posts and cable. The repair job functioned with an efficiency comparable with that of the immersion equipment. Consequently, when the new immersion units were installed, the strip heaters were left in place as a standby, although disconnected at the switch. As an added refinement and safeguard, a Bristol thermocouple was installed to keep the medical staff informed of the water temperature at all times.

•

Standards Plus Cutting Board Help Packing Situation

In a recent study of maintenance practices at a medium-sized coal-mining property where responsibility for packing was divided between the top boss and the pipeman underground, reports K. N. Banthin, mining engineer, Oak Park, Ill., it was found desirable to systematize issuance and cutting to reduce waste and insure proper application. After a survey of all points where packing was required, a check of manufacturers' recommendations as to proper types and determination of the proper lengths, cutting boards such as those shown in the accompanying sketch were constructed. A log book was made up showing each packing point and the recommended type and size of packing to be used. From this record, the mechanic goes to the proper size of board which carries the necessary data for a further check. Inserting the flattened packing in the slot, he places a knife in the proper groove and cuts the designated number of rings of packing.

The advantages of this method include: assurance that the proper type and size of packing is applied; cutting of packing is done in a clean place in the warehouse; the correct number of rings is taken to the job; the packing is cut to the proper length to do the job; boxes or coils of packing are not left lying around out of the warehouse as in the past so that it was lost or dirty when needed; supplies of packing never run out, as the supplyman can keep track of the quantity on hand at all times; and time is saved in the packing operations themselves.

The cutting boards, as indicated in the illustration, are easily made of a few pieces of hard maple. The packing data on the end of a board is protected from grease and dirt by a sheet of $\frac{1}{16}$-in. Pyralin held on by four small wood screws. It can be removed readily for changes or additional data.

Time and Tide

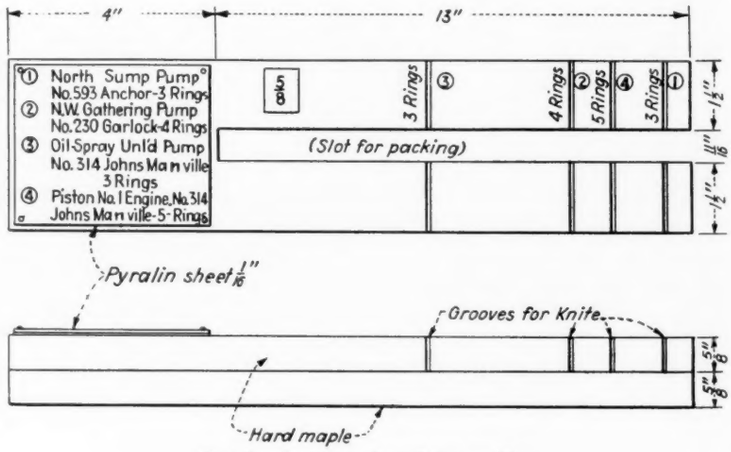
Operating, electrical, mechanical and safety men at coal mines can't afford to emulate Micawber and wait for something to turn up, because the old adage that "Time and tide wait for no man" is particularly applicable to their activities. So they must be on their toes and able to take care of unexpected problems without too much beating around the bush. Knowing how the other fellow did it helps when you're on the spot. And your experience may get him out of a jam some time. So let's have your money-saving or safety-promoting kinks so we can pass them on through the medium of this Operating Ideas section. Send a sketch or photo if it will help to make them clearer. For each acceptable idea, Coal Age will pay $5 or more on publication.

•

Steam-Hoist Operation Checked By Special Recording Meter

The problem of a running record of steam-hoist operation has been solved at the Kings mine of the Princeton Mining Co., Princeton, Ind., by a special five-pen Esterline-Angus recording meter. Number of cars hoisted is registered in tens by means of a pen actuated by an automatic counter on the throttle. This counter is arranged so that it will not register unless the throttle is opened full, which is necessary to hoist a car. Other hoist operations which do not require a full throttle do not move the counter and thus are not registered.

Four types of delays also are registered by the meter. In case of a stoppage on the bottom, a signal light must be lit to inform the hoisting engineer, who then operates a switch to start the pen recording a bottom delay. Another signal light advises the engineer of a stoppage at the ground landing,


4"
13"
① North Sump Pump No. 593 Anchor-3 Rings
② N.W. Gathering Pump No. 230 Garlock-4 Rings
③ Oil-Spray Unit'd Pump No. 314 Johns Manville 3 Rings
④ Piston No. 1 Engine, No. 314 Johns Manville-5-Rings
3 Rings
4 Rings
5 Rings
3 Rings
(Slot for packing)
Pyralin sheet 1/16"
Grooves for Knife
Hard maple

Details of cutting board for packing.

Fast, dependable underground haulage with Exide-Ironclad Batteries

IN stepping up coal production, there is no need to jeopardize dependability of operation. Underground haulage can play its part by delivering increased tonnage to the tipple without heightened risk of service interruptions . . . if full advantage is taken of the capabilities of Exide-Ironclad Batteries.

Exide-Ironclads have the necessary high power ability to make light work of unusual loads and grades. They maintain a good voltage hour after hour, insuring consistently good haulage speeds. And they deliver this type of performance with the utmost dependability for years to come.

Exide
IRONCLAD
BATTERIES

Rugged, trouble-free and long lived in mine haulage —the toughest type of battery service there is—Exide-Ironclads are a safe, sure, economical means of speeding up production. More Exide-Ironclads are used underground than all other batteries combined. Write for free booklet, "The Storage Battery Locomotive for Underground Haulage."

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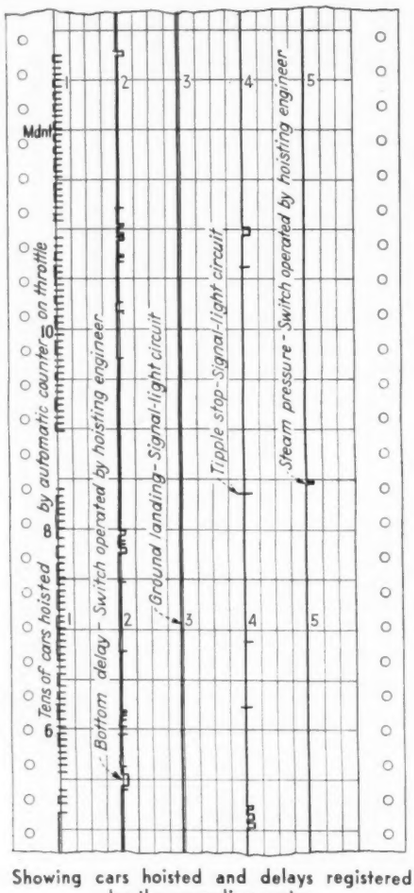
The World's Largest Manufacturers of Storage Batteries for Every Purpose
Exide Batteries of Canada, Limited, Toronto

This recording meter provides a complete record of steam-hoist operation.

with a third light indicating a stoppage in the preparation plant. In case the steam pressure drops below the level required for hoisting, the engineer has a fourth switch to start this particular pen recording the time of the delay.

The meter is designed to provide a record over a complete 24-hour day, with coal hoisting on two shifts and handling of supplies, etc., on the third. Normally, however, the coal-hoisting record is the one of major interest. The record for Dec. 10, 1940 (night shift), is reproduced below.



Showing cars hoisted and delays registered by the recording meter.

Screen Plates Used for Racks Over Oil Spill Cans

Handling lubricants in the oil house at the Cadogan (Pa.) mine of the Allegheny River Mining Co. consists of placing the barrels on a rack running lengthwise of the building. Underneath the faucet on each barrel is placed a spill can made by cutting an 8-in. section, with head, off the end of a barrel. This left the problem of making some sort of a perforated rack to cover the spill cans and support the oil cans while they were being filled.

The problem was solved, relates James Thompson, superintendent, when Mechanics Kane and Round hit upon the use of scrap 1¼-in. round-hole screen. This scrap screen was cut into round sections by a gas torch, with sufficient overlap to permit crimping the sections over the tops of the spill cans, where they provide a very satisfactory support for the oil cans while letting spillage drop into lower containers without hindrance.

•

Cars Dumped Automatically Without Tipping

A different type of dumping arrangement for small truck mines is offered by W. H. Luxton, Linton, Ind., who points out that this scheme, shown in the accompanying illustration, gets away from the forward-tilting, or cradle-type, dump. Instead, the load is dumped from the back end by lifting the door and letting the coal slide out without tipping the car. The car, of course, is on an inclined trestle with pitch enough to cause sliding.

To permit dumping in this fashion, lugs are placed on each side of the car door (lift type) by hooking strap iron over the top iron at each corner, then bringing it down under the lower iron and bending it out to make a projection about 6 in. long. The door is lifted by means of arms with notched ends which engage the lugs. These arms pivot on a wagon axle fastened beneath the track as indicated in the illustration. The lifter arms are made of 2x6 timbers. As the car comes up the incline, the notches in the ends of the arms engage the lugs. The arms then pivot as the car moves on up the incline, lifting the door and permitting the coal to slide out. As the car is dropped back, the door drops and the arms fall back into position to engage the lugs on the next car.

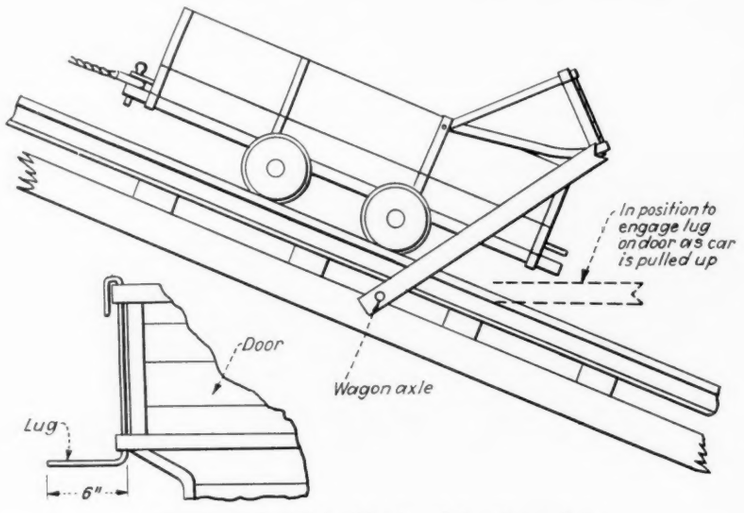
•

Plenty of Air Employed In Fighting Fires

At least two authoritative treatises on mining reiterate the old principles that in fighting mine fires the air must be kept off and the fire areas sealed, points out Alex Bennett, Springfield, Ill. Continuing, Mr. Bennett states that "in the numerous mine fires in this area during the past decade—that is, up to last year, when the problem was practically solved by using a rock-dust dummy next to the powder charge in every drillhole—we have reversed the first principle and phooeyed the second. We don't even need the traditional gallon of whiskey that invariably accompanied the fire-fighting equipment—not to put on the fire but to relieve the nausea the fire fighters were subject to because of the methods employed."

The typical fire "in this field" is "the face fire" resulting from shooting. "Methane, in any proportion, is the only mining hazard we've been spared. We have everything else in abundance, plus. Shooting is done by the drillers, who complete the whole operation at about 4:30 p.m. each operating day. The mine examiner, or fireboss, makes his round at 11 p.m., and upon him usually lies the burden of finding a fire and paving the way for its extermination. One glance at the smoke issuing from a room or entry tells him whether it's a smudge or regular. It is the latter we are concerned with now.

"The fireboss hastens to the nearest telephone and tells the hoisting engineer to flash the lights. He gives the engineer the location of the fire and the number of men needed. On the main line somewhere are two experienced firefighters doing other work but with standing instructions to hasten to the nearest telephone when the lights flash. While the night boss hustles the necessary number of helpers, the two firefighters jump



Diagrammatic sketch of backward-dumping system.

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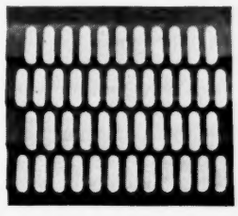
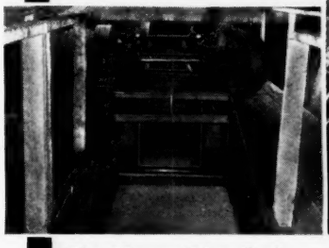
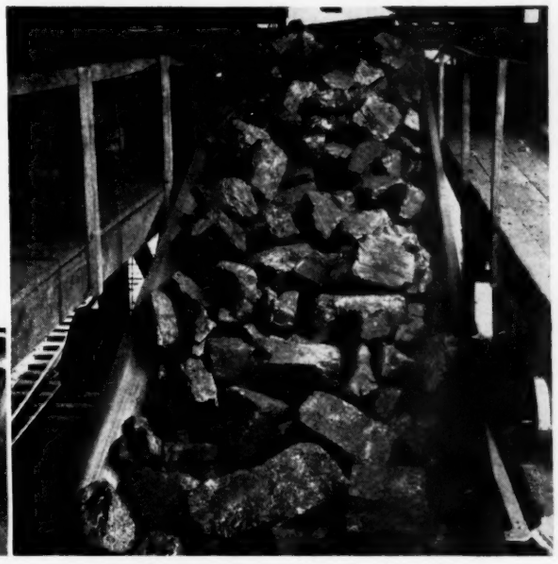
- Coal Washers
- Elevating and Conveying Machinery
- Car Hauls, Picking Tables
- Loading Booms, Loading Chutes
- Bins, Bin Gates
- Car Retarders
- Sand and Gravel Screening and Washing Machinery
- Settling Tank, Grizzlies
- Revolving Screens
- Perforated Metal Screens
- Flanged Lip Screen-Plates

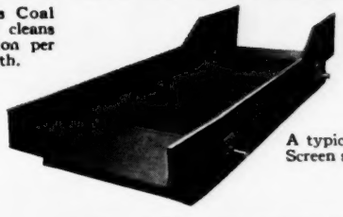




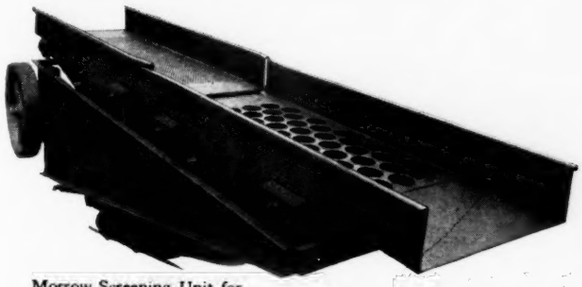
The Morrow-Prins Coal Washer completely cleans and separates 75 ton per hour per foot of width.



An example of "Morrow Prepared" coal.



A typical Morrow Shaking Screen section.



Morrow Screening Unit for Truck Mines and Retail Coal Yards.

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MANUFACTURING CO. WELLSTON, OHIO

DESIGNERS AND BUILDERS OF COAL HANDLING EQUIPMENT FOR OVER 25 YEARS

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on a locomotive and rush to the bottom, where a 500-gal. tank car stands on a siding always ready for such an emergency. This car is used in sprinkling roads at other times, but is always filled before it is returned to the siding. With all the efficiency of a city department, the water is rushed to the fire.

"In the meantime, the fireboss has been making a complete survey of the fire approach and finding out what will be necessary to make that approach safe, speedy and effective. Meanwhile, he lets the fire severely alone, as he knows it would do more harm than good to tackle it himself. Props are located, as well as brattice cloth, nails, axes, shovels and picks, and stacked handy for the tank car to pick up as soon as it arrives.

"As soon as the help and firefighting equipment arrive, each man takes over a definite task. All available air is shorted *to the fire area*" through the crosscut closest to the fire or, if there is no crosscut, directly into the room or entry where the fire is. Brattice lines are installed with just sufficient room for the firefighters to operate, thus reducing the area of the opening and increasing the velocity of the air to the fire to the maximum. Hose lengths of 50 and 100 ft. are available for coupling to a single connection. If these are not sufficient to reach the fire, water buckets are pressed into service, meaning additional men are required. "Then business picks up.

"As soon as the increased air volume hits the fire the blaze is intensified and becomes a definite target for the deluge of water that has never failed to be effective. Routing all the available air to the fire accomplishes two—yes, three—purposes: It furnishes an abundance of fresh air for the workers, which makes the job a sporting proposition instead of a task to be dreaded; brings the blaze into the open for intensified and definite assault; and proves to the satisfaction of all concerned that common sense and tradition are not always synonymous.

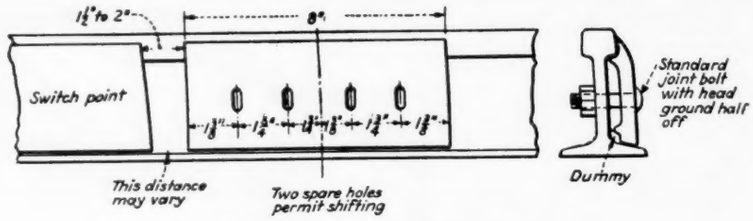
"The usual fight lasts 30 to 60 minutes, after which the coal is scattered. Or, in the event the coal pile is too extensive, the entire cut is loaded out. This procedure applies to every kind of mine fire that can be approached."

•

Cars Held on Grades By Spring Dog

To keep cars from running back on grades, the safety spring dog shown in the accompanying illustration is suggested by V. L. Hamby, New River Co., Summerlee, W. Va. A throw is used to pull the dog back when cars are dropped downgrade, while a compression spring automatically returns the dog to holding position when the throw is released. As the dog is worked by throw and spring, the chances of a man getting hurt, as in setting certain other dogs, are materially reduced. By means of the spring, also, cars may be pulled through and then caught automatically without further attention. A wing on the dog makes this possible.

The dog may be hooked up with a signal light, as indicated in the illustration, this light showing whether it is open or closed. This is a convenience for both motorman and brakeman. Also, as cars are pulled through the dog, the motorman can count the number of flashes of the light and thus spot as many cars above the dog as desired. Or, if a full trip is being pulled through, cessation of the flashing means that all cars are above the dog, and then the motorman can prepare to let them back against it, etc.


1/2" to 2"
8"
Switch point
1 3/8" 1 1/4" 1 1/8" 1 1/8" 1 1/4" 1 3/8"
This distance may vary
Two spare holes permit shifting
Standard joint bolt with head ground half off
Dummy

Details of spring dog and signal light.

•

Switch Points Protected By Metal Guard

Mine turnouts get hard wear and the most vulnerable spot is the switch point, since it must be planed to a sharp edge and at the same time gets severe and repeated blows from passing traffic, points out P. C. Ziemke, Milwaukee, Wis. To improve the situation somewhat, he continues, it is advisable to provide a durable metal protector, or guard. Such a protector will lengthen the life of a switch point six to ten times.

The guard (see illustration) is fashioned from ordinary iron plate stock later hardened by the cyanide process for installations requiring the less durable and less expensive unit. For turnouts subject to severe wear, however, manganese steel is advisable. The illustration indicates how the life of the guard may be doubled by turning it end for end (bolt holes are interchangeable). The guard is inexpensive to install, since only two holes need be drilled or punched in the rail. The four holes shown in the guard are planed to permit movement forward or backward to compensate for rail creep, while elongation of the holes permits shifting the guard up or down, as the occasion requires.

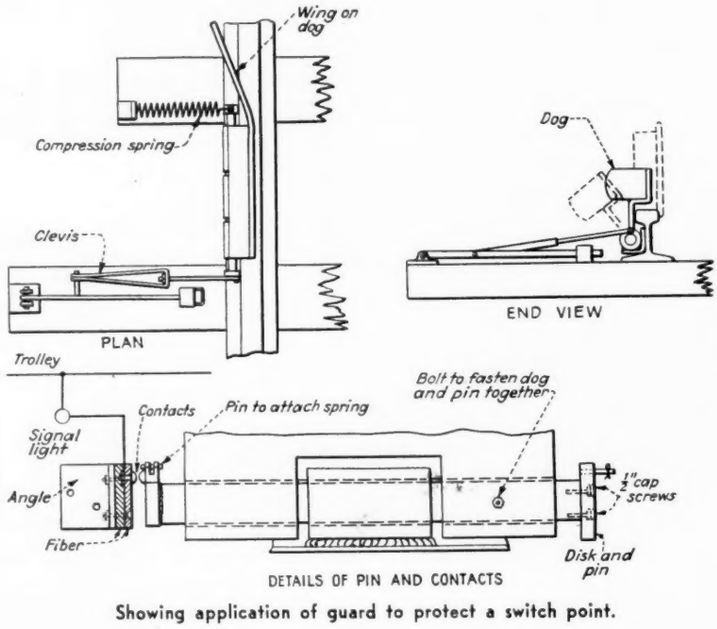
Approximate measurements only are given, as the device must be built to fit the particular size of rail in use. The "dummy" is used to align the guard with the ball of the rail and may be fashioned from ordinary cold-rolled stock.

•

Single-Conductor Cables Used On Cutters and Drills

Substantial savings have been made in the cost of cables for shortwall cutters at Kings mine of the Princeton Mining Co., Princeton, Ind., by the use of ground clamps near the trucks, with single-conductor cables from there out to the wire. In other words, about 50 ft. of regular two-conductor cable is carried on the truck, one side of which is connected to a ground clamp attached to the track rail behind the point where the truck is stationed. The other side is spliced to a regular rubber-covered single-conductor locomotive cable with hot hook, which is carried back to the trolley wire.

Under this system, most of the power supply for the cutter is through a single insulated cable costing much less than the regular two-conductor cable. The single-conductor cable is much less subject to blowouts, particularly at splices, thus promoting safety and reducing machine stoppages. A similar system is used with the coal drills at Kings mine.



Showing application of guard to protect a switch point.

WHAT'S NEW IN THE FIELD

Engineers Delve Anew Into Coal's Operation, Preparation and Safety Problms

ANIMATED presentations and lively discussions of a wide range of engineering subjects marked the proceedings of the Coal Division of the American Institute of Mining and Metallurgical Engineers at the annual meeting, held in New York, Feb. 18 and 19, and of the Health and Safety in Mines Committee, Feb. 19. Most of the time two sessions were held concurrently, one appealing to operating men and one to preparation engineers and scientists.

Phases of Operating Economy

Methods of working, mechanization of slope driving, rubber-tired haulage, and handling of acid water received intensive study in several well-attended sessions.

When, in the Hickory Swamp-Ridge basin of the Western Middle Anthracite Field, the No. 5 bed (a seam with 2 ft. 6 in. of coal in the upper bench and 2 ft. of coal in the lower with an 8- to 20-in. rock divider) was developed, it was found that the mining of No. 4 seam 37 years earlier and 55 ft. below it in the clear had weakened the upper seam considerably wherever removal of the lower seam had been complete, said W. H. Moore, mining engineer, Susquehanna Collieries Co., Shamokin, Pa. The coal bed pitched from 5 to 25 deg., and the breasts, which were driven on 50-ft. centers straight up the pitch and 24 ft. wide (where roof conditions permitted), needed only two rows of posts, except where the coal had been extracted completely in the lower seam.

The upper bench was removed first and loaded on a conveyor. Then the slate was shot up and gobbed on either side. Finally, the lower bench was blasted and placed on the conveyor. In places the seam had drawn away from the roof 3 to 8 in. and in others the bottom slate had drawn away from the coal, yet, over a 2,000 x 4,000-ft. area, no general caving or squeezing was noted. Starting at the end of the breast, pillars were drawn, but in this much timber had to be used. However, ultimate recovery was about 90 per cent of the entire deposit.

In the same basin, with a pitch of 48 to 75 deg., said E. T. Powell, mining engineer, Susquehanna Collieries Co., Glen Lyon, Pa., No. 9 seam—a 7-ft. bed—was completely extracted and then No. 8 seam, 9 ft. 6 in. thick, was removed from beneath it. The thickness of the intervening rock was only 6 ft. Some time after, it was decided to mine seams Nos. 9½ and 9¾ above No. 9, these two beds being 4 ft. 6 in. and 5 ft. 2 in. thick and 49 and 104 ft. above No. 9 respectively.

Both have heavy clod as immediate roof; No. 9½, 20 in. thick, and No. 9¾, 32 in. thick. This clod would come down and mix with the coal where the roof had been disturbed by earlier mining in Seam No. 9 and later in Seam No. 8. To prevent this, the breasts were driven 25 deg. off the strike. At times, the coal has been found to have drawn away from the top clod. Sometimes this slate bed has followed the coal and left a space of 2 to 8 in. under the main roof.

When pillars in an underlying seam have been left in place, the coal in the upper seam can be more effectively removed than where the pillars in the lower seam have been drawn, for the subsidence that occurs in that seam in the first case damages the coal bed less than in the second. When the rock interval between seams is 100 ft. or more and the underlying bed is less than 10 ft. thick, the overlying seam usually can be removed without much difficulty.

Loading-Machine and Shuttle-Car Data for West Virginia Mines

Thickness of Bed, Inches	Max. Shuttle-Car Travel, Feet	Shuttle Cars per Loading Unit	Men in Crew	Places per Machine	Av. Shuttle-Car Capacity, Tons	Av. Mine-Car Capacity, Tons	Tonnage per Loading Unit	Tonnage per Shuttle Car	Tonnage per Man on Crew	Tonnage per Loading Unit per In. of Bed Thickness	Tonnage per Loading Unit per Cu. Ft. of Cut†
72	700	3	16	14	3.0	6	513	171	32.10	85.5	1.19
78	720	3	18	24	4.8	4	475	158	26.40	73.1	0.65
90	700	3	21	10	4.5	3.1	500	167	23.80	66.7	0.60
90	500	2	16	12	4.4	2	350	175	21.90	46.7	0.47
46	500	2	18	10	3.0	{2.2* / 1.6}	300	150	16.66	78.3	0.44

*About half the cars are of 2.2 tons capacity. † Figure in this column is to some degree a measure of relative efficiency, especially if the several operations are working the same bed and have somewhat similar conditions.

Though shuttle cars were used first in Illinois in 1936, the first unit of rubber-tired haulage to be used in West Virginia was shipped into that State in 1938, asserted D. L. McElroy, director, School of Mines, West Virginia University, for himself and J. L. Schroder, graduate assistant.

Tonnage per shuttle car is practically as large when three shuttle cars are used per loading machine as when only two are in use. This shows the advantage of the third car, for, according to the table, an increase in tonnage is obtained per loader almost equal to what one car hauls in an ordinary two-car set-up. Tons per man on crew is likewise increased when the third shuttle car is provided.

One study showed 44.7 per cent of the time was used in loading coal, 23.1 per cent in waiting for shuttle car, 12.2 in tramming the loading machine, 10.2 in preparing coal for loader, 4.7 in shifting loader in working place and the rest in various small items.

Alleged advantages of shuttle cars are: (1) reduction of car-shifting time at loader, though this may be less evident if large mine cars are used for gathering; (2) elimination of track; (3) flexibility of travel; (4) safety, because noise is reduced and cars are not coupled; (5) lowering of peak loads; (6) ability of shuttle car to follow up loading machine, for track does not limit its movement. Disadvantages are: (1) dependence on condition of top and bottom; (2) car clearances not as exact as with track haulage; (3) machines have to be mounted on caterpillar trucks because of absence of track and so are slow and lack capacity, hence off-shift cutting is required; a cutting machine on rubber tires may be in the offing; (4) less gob space in haulways; (5) declining power of batteries, and (6) coal handled more often than desirable. Early types are now being converted to 4-wheel drives and wheelbase has been shortened to aid in negotiating corners.

Belt conveyors, stated Carel Robinson, consulting engineer, Charleston, W. Va., are the most dependable form of transportation. Records in early installations were faulty and belts were used mainly in thin-seam operation. Capacities were underrated, being based on experience with other materials than coal. Consequently, the value of belts was in question. At several mines belt conveyors are handling 100 per cent, and in one case 200 per cent more coal than the textbooks say they can.

Conveyor manufacturers generally have declared that the faster a belt runs, the harder it will be to train, but now that is disproved. As speeds are increased above 300 f.p.m. the belt is more easily trained. High speeds also reduce spillage and wear. High speed caused more wear several years ago when the life of the belt was determined by the strains involved in "flexing" the belt over the pulleys, but today belts are not thus injured. The "flexing life" of the belt, as it is termed, is longer than the life as determined by other factors.

In eastern Ohio, the coal has a 12-in. weak drawslate which is taken down, and above this is a seam of roof coal up to 24 in. thick

which when present must be taken down or supported. Above this is shale, soapstone and clay, 5 to 8 ft. thick, and then a hard blue limestone, the first dependable roof, declared James Hyslop, general manager, Hanna Coal Co., in a paper read by Prof. J. W. Buch, Penn State.

Wood or steel crossbars serve well to support the roof when headings are to be used for only five years, but, where longer life is demanded, gunite has been substituted. The Hanna Coal Co. has had six years' experience with that material. Where appreciable structural strength is required the coating is 2 in. or more thick with suitable reinforcing, but generally only 1 in. of gunite is provided to shield the strata from air and moisture.

Where intake air still has wide variations in temperature, gunite has not been applied successfully. It is used, therefore, only in return headings or in intake headings which are far enough from the surface to have reached mine temperature. About ten miles of heading have been gunited in eastern Ohio, which, with proper inspection and maintenance, should last at least 15 years. Main haulageways are gunited as soon as driven.

Why Gunite in Winter?

As the gunite should be applied on a dry surface, winter is the best time for gunite application. The first ¼-in. coat is given one day and a ¾-in. finish coat the next. With a good crew, 60 to 70 sacks of cement can be placed in seven hours, or about 800 or 1,000 sq.ft. of gunite, roughly 35 linear feet of heading. Cost per square foot runs: Scaling and preparing, 5.17c; cement, 4.26c; sand, 1.57c; application, 4.66c; power and depreciation, 0.61c; total, 16.27c. Total cost per linear foot, $5.10.

Cast-iron pipe, though effective as a discharge line in boreholes for acid mine water being pumped to the surface, is not so suitable as a conduit for the flushing of silt and crushed rock, asserted John S. Johnson, superintendent, preparation and maintenance, Hudson Coal Co. Terra-cotta pipe will last a long time if the glazed inner surface of the pipe remains intact, but it is installed with difficulty and can be recommended only where subsidence in the surrounding territory need not be apprehended. Unless the men who place the pipe can have access to each joint, the work will be unsatisfactory. When the boreholes are large enough to lower a man into the hole to seal the joints the work can be and has been successfully done.

A special cast-iron pipe, usually 10 ft. long and made of a mixture of high-grade pig iron and steel scrap, may be used for lining pump-discharge holes where water cannot be pumped satisfactorily through the bare rock. It is soft enough that threads may be cut on the outside of the spigot end and the inside of the bell end. A square set is cut on the bell end and both ends are squared up so that the pipes when joined will be accurately aligned. After greasing the threads, the pipes (held by a rope thrown over a sheave and connected at the far end with a cast-iron block through a swiveled eyebolt to the lower end of the first pipe lowered into the drillhole) are screwed together. Copper or solder is caulked between bell and sprocket. No more than 200 ft., or 20 sections, thus can be joined and lowered because of the weight of the pipe. The block is kept in position until the pipe has been cemented in place.

Another pipe can be placed below the first with a slip, instead of a screw, connection thereto, but, if this is to be done, the first pipe should contain no more than ten lengths. If, however, connection can be made at the opening to an intermediate coal bed, the pipe can be fitted there and the sections either screwed or welded together or jointed by molten lead. In more than 20 years, no such pipes have been destroyed by the corrosion of mine water or erosion by backfilling. Thin cement mortar or a 1 to 1 mix of fine sharp sand and cement is poured around the pipe.

A 24-in. cast-iron pipe with a 1-in. wall was fitted together from 10-ft. lengths with ground slip joints into a hole 671 ft. deep at the Truesdale colliery of the Glen Alden Coal Co. The joints were lowered one at a time and were accompanied by a man riding on a small improvised canopied carriage, which dropped down inside the pipe and was lowered with it. An escape trap was provided at the bottom of the carriage for use in case of accident. After each length of pipe was placed, the space between the outside surface of the pipe and the wall of the hole was filled with mortar.

A pipe constructed of cotton duck and rubber with the lower half reinforced with helical wire—inside diameter 4 in.; outside diameter, 6 in., and length, 90 ft. over all—is being used at the Marvine colliery for flushing. The pipe was made in two parts which were spliced together without change in diameter. The pipe was installed May 26, 1939, and continues to give good service.

Southwestern Wyoming coal beds dip from the surface at inclinations of 4 to 17 deg., asserted Eugene McAuliffe, president, Union Pacific Coal Co., speaking for J. E. Willson and F. P. Lebar, resident engineers, of Reliance and Winton, Wyo., respectively. In earlier years, in extending a slope entry system down the pitch, the first stage was to drive the main slope; then crosscuts were driven and planes extended up the pitch to form auxiliary slopes, thus completing the slope entry system.

This was a somewhat slow and unsatisfactory performance. Eventually more speed was made and a more positive system of ventilation provided by extending the main slope and its manway in the same forward direction. If the cost of driving the slope down the pitch by hand loading is taken as 100, that of driving up the pitch with hand loading was 92.36, that of driving down the pitch with a 7 BU Joy mobile loader was 64.24, and that of driving up the pitch as a plane with shaking conveyors was 59.66, all calculations being based on the present scale of wages. With the old method 600 ft. was driven in a year, whereas, with the new, 1,000 ft. is driven in three to four months; thus during busy periods the mobile loader can be used in room work as a major producing unit or, when a mine has to be developed, levels can be made available in a short time either for use or as a backlog in case a big increased tonnage at any time might prove desirable.

A Joy operator, a machine man, two trackayers, a hoist man, a rope rider and a unit foreman constitute the loading crew. Rails are kept to the face by a 30-ft. sliding extension used in conjunction with 40-lb. track, which later is replaced by 75-lb. steel laid when turnouts are installed.

Coming Meetings

- Canadian Institute of Mining and Metallurgy; annual meeting, March 10-12, Windsor Hotel, Montreal, Canada.
- Utah Coal Operators' Association: annual meeting, April 2, 709 Tribune Telegram Building, Salt Lake City, Utah.
- Midwest Power Conference: April 9 and 10, Palmer House, Chicago.
- American Mining Congress: eighteenth annual coal-mining convention and exposition, April 28 to May 3, Cincinnati, Ohio.
- Fourth annual Anthracite Conference: May 8 and 9, Lehigh University, Bethlehem, Pa.
- Sixth Short Course in Coal Utilization: University of Illinois, Urbana, May 21-23.
- Stoker Manufacturers' Association: annual meeting, May 26 and 27, White Sulphur Springs, W. Va.
- Mine Inspectors' Institute: annual meeting, June 2-4, Bluefield, W. Va.
- Illinois Mining Institute: 23d annual boat trip and summer meeting, aboard Str. "Golden Eagle," leaving St. Louis June 6 and returning June 8.

Preparation, Hard and Soft Coal

How to clean coal and to sell it when cleaned occupied two sessions of the Coal Division, Feb. 18. Breakers shipping 2,000 tons in seven hours operated by twelve men, excluding car loaders, indicate the trend of design in the anthracite region, declared W. H. Lesser, mechanical engineer, J. H. Pierce Management, introducing several papers by the mining and preparation engineers operating such breakers. A paper by George H. Jones, president, Stevens Coal Co., discussed the washer at Trevorton, Pa., where the coal is cleaned by Hydrotators (*Coal Age*, June, 1939, p. 48). In 1½ years, labor costs ran 1c. per ton shipped, and repairs, 0.1c. Five men operate the washer.

Three stages distinguish the cleaning of anthracite at the 923-tons-per-hour jig-and-Chance-cone breaker of the Hudson Coal Co. located at Olyphant, Pa., as described by J. S. Johnson, superintendent of preparation, and presented by Mr. Lesser. In the primary stage, egg to pea is cleaned in 38 jigs so adjusted as to produce coal sufficiently clean to permit it to be passed direct to pockets, but, thus operated, too much coal and bone are discharged with the slate, so, in succeeding stages, Chance cones are

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used to clean the slate ends of the stove, nut and pea jigs and also the egg slate after diversion to rolls which reduce it to stove and smaller.

Including the labor of the tailings cone attendant, the average operating labor cost per ton of coal cleaned at the Huber breaker of the Glen Alden Coal Co. (*Coal Age*, April, 1939, p. 68) was 0.37c. per ton for the year 1939. After 15 months of service, said J. H. Doughty, superintendent, preparation and construction, in the paper Mr. Lesser read, no repair or maintenance costs were necessary other than a periodic cleaning and tightening up, which has required the labor of one man for four hours twice a month on each cone.

After five years of service at Bliss colliery, with the same type of Menzies cone separators, labor in 1939 cost 0.23c. per ton, and material, 0.73c., or less than 1c. per ton. Power cost per ton of coal cleaned at Huber colliery for 1939 was 0.28c. per ton. Total for operation, repairs, maintenance and power costs was 1.61c. per gross ton of coal cleaned.

Describing Dorrance breaker of the Lehigh Valley Coal Co., at Wilkes-Barre, Pa. (*Coal Age*, September, 1930, p. 535), for Eugene M. Florey, mechanical department, Mr. Lesser said the cubical capacity of this Rheolaveur breaker is 639,500 ft. and capacity 3,000 tons of shipped coal daily, or 213,166 cu.ft. of space per ton of product.

Impurities in the run-of-mine feed at the mines of the Lehigh Navigation Coal Co., said Mr. Lesser for C. D. Rubert, superintendent of preparation, vary from 30 to 35 per cent. Lehigh overflow or plunger-type jigs or Wilmot pan-type jigs are used. The latter jigs are used chiefly as roughing units for steamboat and broken, where particular attention is given to a clean refuse end. However, it is sometimes used to clean egg.

	Slate in Shipped Coal, Per Cent	Coal in Refuse, Per Cent	Feed Capacity Per Single Jig-Hour, Net Tons
Egg	1.3	0.1	6.8
Stove	1.6	1.4	13.8
Chestnut..	2.1	1.4	16.0
Pea	4.1	1.6	16.8
Buckwheat	12.0 (Ash)	5.0	15.6

In some cases, coal is blended in a classification yard and cars are dumped so as to get a uniform mixture. Speeds, plunger strokes, perforations and pitches of jig plates and depths of bed are varied for different coal sizes. Each jig attendant operates six single jigs. By proper sizing, deepening jig bed and decreasing plunger speed, flats can be removed from stove and chestnut by jigging, but coal is crushed and returned to repreparation so as to avoid loss of coal in refuse.

At Lehigh Navigation mines, experiments with concentrating tables commenced in 1918, but not until 1922 was success attained. Diagonal-deck Deister-Overstrom coal washing tables now clean buckwheat, rice, barley and Anthrafine, also chestnut and pea flats.

For 20 years Alabama probably has led all other districts in the percentage of coal prepared by wet-washing, asserted H. J. Hager, superintendent, Colta mine, Alabama By-Products Corporation. With one exception, all rail mines now wash all coal under 3 to 4 in. Most truck mines are doing the same. Tables are now used (1) to wash raw-coal fines, (2) to rewash fine jigged coal and (3) to retreat jig middlings.

To get a high-grade coal it was necessary to produce middlings and find a use for them. This material constitutes 11 per cent of the table products and has 18 to 20 per cent of ash. Raw coal, middlings and clean coal have 22.12, 18.25 and 9.56 per cent of ash respectively.

During the last ten years purchase of coal on specification has made slow progress, according to R. B. Textor, president, Textor Laboratories, Cleveland, Ohio, because coal has been sold on price rather than quality and because it was thought that, when coal is bought under specifications, more must be paid for it without commensurate advantage. But the chief reason is that operators do not know definitely the normal range of analysis and size-consist of their delivered coal and large coal users have not assembled data on the coals they have obtained from various mines, districts and seams so that they can tell which of them gives most satisfactory combustion, lowest steam-production and lowest cost per million B.t.u. delivered.

Overestimation of coal quality by any one of a group of bidders—whether intentional or otherwise—is unfair to other bidders as well as to the prospective buyer and tends to compel them to follow similar practices. Only a specification with definite provision for a reduction in price where the coal is of less value than specified will correct these abuses.

Operators have been accustomed to base their analyses on the water content as the coal left their tipples, whereas most contracts are on the "as received" basis, except where payment is on the B.t.u. in the dried coal. Operators, from analyses taken over a long period of time, can ascertain what the moisture percentage will average when delivering to certain points, and they should begin accumulating such data. Cities which do so can aid a supplier to make an intelligen bid and can help themselves determine whether the supplier has done so.

Objections were taken by Dr. C. J. Potter, manager of preparation, Rochester & Pittsburgh Coal Co., to penalties given for failure to reach standards without premiums for exceeding them and to penalties for water added in transit.

Customers are not interested in the per cent of sink material in the coal they buy, asserted P. W. F. J. Moran, preparation manager, Pyramid Coal Corporation, but in its ash content. By graphs prepared for each individual coal seam and area, chemists may try to convert the sink material percentage into ash content, but results vary widely because sinks are of variant materials. Many coals have float ash varying several per cent, so the float-and-sink basis of evaluating washery performance does not provide the preparation manager with what he wants—an accurate evaluation of ash content. The method is slow and tedious also, though some such determinations usually have to be made.

At Pinckneyville, Ill., about 20 minutes after a sample has been collected, control ash figures are placed on a board where the washery operator can see them. Other less public systems of communication could be devised. A signal board electrically operated from the laboratory is proposed. A sample is collected from each car of screenings and stoker coal, and a composite for the shift of each size is made. Practically all samples are taken by hand at the end of loading chutes or booms. Without quartering or drying, the sample is crushed to about $\frac{3}{16}$ in. in a 12x12-in. ring crusher. A riffle reduces the sample to $\frac{1}{2}$ lb., which is placed in a large electric roasting oven set at 400 deg. F. with extra vents in the oven lid. The sample is then pulverized to 60-mesh in a rotary-disk pulverizer, riffled to 2 oz., placed in a stoppered bottle and passed to analytical room.

A gram sample is measured on a precision chainomatic balance and placed in a combustion boat which is introduced into the furnace so that the large open end of the tube protrudes about the length of a combustion boat beyond the end of the furnace proper. Thus, the sample warms up at a temperature below that of the furnace, driving off volatile matter without violence and mechanical loss. Then the boat is advanced into the high temperature of the furnace and combustion accelerated by delivering oxygen to the combustion tube. In five minutes the sample is reduced to ash, which is termed "control ash." Experience has shown that the moisture-free ash can be estimated from the control ash by a calculation based on a $2\frac{1}{2}$ per cent moisture allowance, but in an hour the correct figure can be obtained if desired.

Mine Safety and Health

Several papers at the meeting related to safety, the equipment by which safety may be assured, and the health of mine workers. Mine accidents are three times as frequent and their effect seven times as severe per million man-hours as those in about 30 of the larger industries of the United States, commented D. Harrington, chief, health and safety branch, U. S. Bureau of Mines. Our coal mines have accident rates two, three or more times as high as those in England and Wales, Belgium, France and Germany, but

Coal Thickness Compared With Accidents Underground

Seam Thickness, in.	Number of Mines	Average Men per Mine	Rate per Million Killed	Man-Hours Injured
13–24	215	26	1.19	42.58
25–36	965	34	1.72	72.76
37–48	1,366	73	1.89	89.04
49–60	862	80	2.16	79.37
61–72	615	93	1.87	87.30
73–84	324	129	2.01	78.22
85+	399	105	1.53	80.89
Not stated	1,270	19	3.26	56.73
Total Underground	6,016	62	1.97	80.73

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the accident rates of all the people of the United States are two, three or more times those of European peoples, and, after all, the mine-accident severity rate in British mines is about six times that experienced in the larger industries of Great Britain.

Mines with thin coal have the fewest accidents per million man-hours of employment, as in the accompanying table. This suggests that perhaps the miners of Europe have fewer accidents, because, in general, the seams mined are thinner than ours.

"Anthraco-silicosis," said R. H. Flinn, passed assistant surgeon, U. S. Public Health Service, "is a modified form of silicosis, due to breathing siliceous dust mixed with large quantities of carbon dust," in an address covering the same ground as an article on Utah occupation disease study, on another page.

It is easy, said R. R. Sayers, director, U. S. Bureau of Mines, to prevent anthraco-silicosis by good ventilation and a plentiful use of water, and both these are preventives of mine explosions. Anthraco-silicosis is not easy to get, but, if contracted, is a severe affliction.

Lowest possible cost for ventilation rather than fan efficiency is the need of the mine operator, asseverated T. H. Troller, director, Guggenheim Airship Institute. Fan efficiency is not the only factor to consider, and, moreover, that expression has a variety of definitions. Fan price and installation cost are not in fixed ratio to air horsepower delivered and therefore cannot be expected to find expression in the fan efficiency. A fan with more than 90 per cent efficiency undoubtedly could be built for most applications, but the last few per cents of efficiency would be excessively costly from an installation standpoint.

Double doors are used on all headings approaching the working faces at Nemacolin, Pa., except in headings by which air is taken to and from the face, declared A. W. Hesse, chief coal-mining engineer, Buckeye Coal Co. Cutting and loading machines are equipped with piping and water sprays, and water is supplied by lines throughout the mine by which these sprays are fed. Dust made in cutting and loading is wetted down.

Organization is the first requirement in handling mine fires, according to P. H. Dever, assistant to the general manager, Glen Alden Coal Co. The organization should not be thrown together in the excitement and confusion of the emergency, but one whose personnel is the product of much thought and attention prior to a fire or explosion.

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A.S.T.M. Proceedings Issued

Proceedings of the 1940 annual meeting of the American Society for Testing Materials, containing about 1,400 pages, has been issued in one volume. It includes the many committee reports and appended material presented at the annual meeting, as well as the technical papers and discussions, affording valuable data and information on the properties and tests of engineering materials. Copies may be obtained from the society's headquarters, Philadelphia, at $8.50 (heavy paper binding); $9 (cloth), and $10 (half leather).

Operators, Union and State Agree on Plan To End Anthracite Bootlegging

A LONG-RANGE plan to end bootlegging in the anthracite region of Pennsylvania whereby the outlaw miners would be absorbed by legitimate producers and the illicit coal holes dynamited has been agreed to by operators and the United Mine Workers. The plan, which is sponsored by Governor James, has been signed by all but one operator, who is said not to have been in agreement with any voluntary plan.

The agreement, which takes the form of an amendment to the voluntary allocation production plan formulated a year ago, provides that legitimate producers may increase their production allocations by hiring bootleggers. For every bootlegger put on the payroll the operator will have a supplemental production quota of 3¼ net tons per day.

Operators may not only receive a "bonus" for employing bootleggers but may purchase the output of bootleggers under lease arrangements without affecting their regular allocations under the emergency program. As the bootleg miners obtain employment in legitimate industry, the State will dynamite their coal holes.

The text of the agreement is as follows:

Sect. 1 (A)—The emergency committee shall cause to be made immediately a survey of all bootleg holes and preparation plants in the bootleg areas of the anthracite field, which survey shall show the location and daily production of each hole and preparation plant, together with the names, residence, employment history, and family relationship to the industry of those working at said hole and preparation plant.

(B)—Such survey shall include all other operations of a similar character which are not being operated in conformity with the laws of Pennsylvania relative to health, safety and compensation, and the prevailing labor standards of the industry.

(C)—Such survey shall further include as of Nov. 30, 1940, the number of employees of any cooperating producer who contemplates the employment of bootleggers, as herein provided, classified as to their principal occupations.

(D)—The emergency committee shall cause to be made a resurvey of the bootleg holes and preparation plants as often as it may deem desirable but not less than once in any three months period.

Contracts With Bootleggers

Sec. 2 (A)—Any cooperating producer making lawful arrangements with any bootlegger or bootleggers listed in said survey for the purchase by said cooperating producer of the output of said bootlegging hole or holes with the sanction of the owner or lessee of said property from which said output is taken, shall be permitted to do so in addition to and without affecting the percentage position of said producer under this program, provided that said arrangements shall under no circumstances extend beyond March 31, 1942, and shall apply only to bootleg holes in operation in the month of January, 1941.

(B)—The mining of bootleg coal and the purchase thereof by a cooperating producer from each bootleg hole shall be limited to the daily rate of production of such hole as found by the survey provided for in Sec. 1 (A) and to the number of days worked each week by the present mines of said producer in mining his allocated tonnage under Schedule A of this program, unless otherwise authorized by the emergency committee. The production so purchased by the cooperating producer shall be reported to the emergency committee and by it to the cooperating producers in accordance with the provisions of this program and the regulations issued in respect thereto, either in exact amount of commercial production through separate preparation or in the run-of-mine weights translated to a basis of commercial production under formulas of test approved by the emergency committee.

Keeping Step With Coal Demand

Bituminous Coal Stocks

	Thousands Net Tons Jan. 1 1941	P. C. Change From Dec. 1 1940	P. C. Change From Jan. 1 1940
Electric power utilities	11,336	— 0.67	+24.31
Byproduct coke ovens	10,184	+ 0.92	+27.41
Steel and rolling mills	780	+12.88	+12.71
Railroads (Class 1)	5,928	+ 3.13	+ 7.22
Other industrials	14,710	— 1.79	+ 6.68
Total	42,938	+ 0.04	+15.67

Bituminous Coal Consumption

	Thousands Net Tons Dec. 1940	P. C. Change From Nov. 1940	P. C. Change From Dec. 1939
Electric power utilities	4,737	+3.38	+1.15
Byproduct coke ovens	6,999	+2.94	+4.96
Steel and rolling mills	957	+6.93	—7.00
Railroads (Class 1)	8,069	+6.25	+8.15
Other industrials*	11,950	+7.74	+6.79
Total	32,712	+5.65	+5.41

* Includes beehive ovens, coal-gas retorts and cement mills.

Coal Production

Bituminous	
Month of January, 1941, net tons	43,905,000
Per cent dec. from Jan., 1940	0.16
Anthracite	
Month of January, 1941, net tons	4,975,000
Per cent dec. from Jan., 1940	11.51

Sales of Domestic Coal Stokers vs. Oil Burners

Sales	Coal Stokers	Oil Burners
December, 1940	6,103	11,240
Per cent inc. over Dec., 1939	28.16	—25.81*

* Decrease

Index of Business Activity*

Latest week	144.3
Per cent rise from month ago	1.40
Per cent rise from year ago	27.02

* *Business Week*, Feb. 15.

Electrical Power Outputt

Week ended Feb. 8, kw.-hr.	2,823,651,000
Per cent decline from month ago	0.70
Per cent gain over year ago	11.90

† Edison Electric Institute.

HOW YOU CAN SCREEN BETTER

...with selective throw

• Changes in screening conditions increase PLAT-O's value to you. If your materials are wet one day, dry the next—or if you change products on the same screen . . . then you need PLAT-O!

PLAT-O's selective throw is the simplest mechanism on the market today.

The off-balance flywheels are engineered with the whole screen so it is impossible to overload to a point where the throw is affected to any measurable degree.

If your materials change, or if you feel that either a stronger or weaker throw could give you greater capacity or better grading or both, it is very easy to change the length of stroke.

Simply loosen the set screws of the inside pulleys on both ends of the shaft as illustrated and set them in different notches (just so both correspond). Then tighten the set screws, and start the screen.

DEMAND THESE FEATURES

• Opposed Elliptical Throw ... Low Headroom, Accurate Grading, High Capacity • Selective Throw • Powerful Positive High Speed • Oil—Not Grease • Automatic Screen Cloth Tension—Each Deck Independently Changed • Vibration Fully Cushioned • Only Two Bearings • Lowest Power Requirements.

PLAT-O by DEISTER

DEISTER MACHINE COMPANY • FORT WAYNE, INDIANA

Sec. 3 (A)—Any cooperating producer adding to the total number of his employees (as shown by the survey) by the employment of bootleggers shall be assigned a supplemental allocation, under this program, equal to 3¼ net tons of 2,000 lb. per man per day of commercial production for each week by the mines of said producer in mining his allocated tonnage under Schedule (A) of this program. The emergency committee shall require reports, subject to verification, on a definite date each month from such cooperating producer, as to all the facts material to the granting of such supplemental allocation for the succeeding month. Failure to furnish satisfactory reports when and as required by the committee shall result in the withholding of any supplemental allocation.

Sec. 4 (A)—Every effort shall be made to open additional mines in the bootleg areas for the primary purpose of employing bootleggers. When application is filed with the emergency committee for an allocation for an operation to be started for said purpose, the applicant shall be required to furnish satisfactory evidence to the committee and the producers' board (1) that such purposes will be served; (2) that he has ability to properly finance said operation from its inception to the amount of the daily production set as the ultimate daily allocation; and (3) that applicant proposes to adhere to the wage and hour standards applicable to the area in which his mine is located, as provided in the agreement between the anthracite operators and the United Mine Workers.

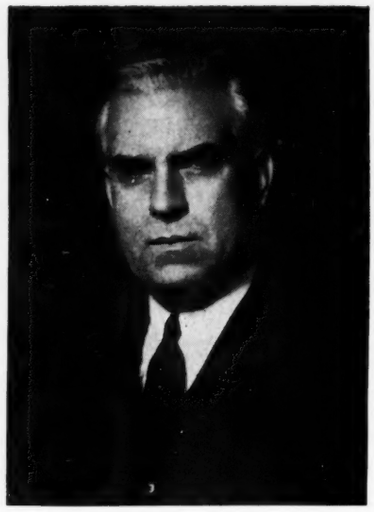
Award for Hiring Bootlegger

(B)—Upon satisfactory evidence of ability to operate under the above provisions, the emergency committee shall fix the ultimate daily allocation of the operation and shall assign such producer, from time to time, a supplemental allocation for said operation equal to 3¼ net tons of 2,000 lb. commercial production per day for each man employed therein but limited to that number of days per week ascertained by dividing the total weekly tonnage regularly allocated under Schedule A by the daily production effective, at the time, under Schedule A. When said daily supplemental allocation equals the fixed ultimate daily allocation, the operation involved shall be included in Schedule A and assigned a definite percentage under said schedule, in the ratio that its fixed ultimate daily production bears to the total production of all cooperating producers, in determining percentage positions under Schedule A; and the percentage positions of all cooperating producers shall thereupon be adjusted to compensate for the percentage position assigned to the operation involved. Such supplemental allocation shall continue only so long as such mines continue to be operated in a manner not inconsistent with the primary purpose of their opening.

Sec. 5 (A)—The total production allocated under the provisions of Secs. 3 and 4 above shall not exceed 4 per cent of the aggregate tonnage regularly allocated to cooperating producers under said Schedule A, whether weekly or cumulatively.

(B)—The term bootlegger as used in Secs. 3 and 4 above refers only to those now in the bootleg industry who have a family background of employment or previous employment in the legitimate industry, as determined by the survey contemplated in Sec. 1 (A) of this article.

(C)—The provisions of Art. V (A) inclusive of this program and any other provisions in substantial conflict therewith shall not be deemed applicable to this Article VI relating to "displacing bootleg and unlawful operations" except that all provisions of this program shall be deemed applicable to new operations assigned a definite percentage under Schedule A pursuant to Sec. 4 hereof.



L. C. Campbell

Continental Co.'s Brock Mine Passes to New Owner

Purchase of the Continental Coal Co.'s Brock mine, at Cassville, W. Va., by a new corporation headed by Frank E. Christopher was announced Feb. 8. Associated with Mr. Christopher in the new concern, known as Brock, Inc., are Lee Christopher, Benjamin G. Reeder and Louis F. Tanner.

The plant includes a large tipple, a practically new cleaning plant, 100 dwellings and 600 acres of coal land. Closed last July, when the Continental company failed, the Brock mine was at one time one of the major coal producers of northern West Virginia with an annual output exceeding 1,000,000 tons.

The new owners said the mine would be reopened some time in February with about 150 men employed. Frank E. Christopher was vice-president of the Continental company until 1935, when he began business independently.

Anti-Bootleg Law Sustained

The United States Supreme Court on Feb. 17 reversed and remanded for further information a lower court decision holding unconstitutional the New Jersey "certificate of origin" act designed to prevent sale of so-called bootleg anthracite in that State. The court asked for a determination whether an amount sufficient to warrant federal court jurisdiction ($3,000) was involved and whether "a case has been made for the granting of an injunction restraining criminal prosecutions."

Personal Notes

MOUNT BURNS, manager of the Chicago retail stoker division of the Link-Belt Co., was chosen president of the Midwest Stoker Association at its annual meeting. He succeeds L. G. Briggs. Other officers named are: vice-president, E. M. MAY, Chicago branch manager, Combustioneer division, Steel Products Engineering Co.; secretary-treasurer, E. W. JONES, Chicago office manager, Iron Fireman Mfg. Co. MARC G. BLUTH was reappointed manager.

L. C. CAMPBELL, heretofore assistant to the vice-president, Koppers Coal Co., has been made general manager of mines, with headquarters in Pittsburgh. He joined the company in 1927 as general superintendent, and was made assistant to the vice-president in 1934. He was graduated from Pennsylvania State College in 1915 with the degree of Mining Engineer.

MARION FOLSOM, head of the Mining and Minerals Products section, Production Division of the Office of Production Management, in the Federal Defense Program set-up, has resigned to return to his private business. He is being succeeded by G. M. MOFFETT, formerly of the Food Products section. Mr. Folsom, however, will spend several days each month in Washington in a part-time advisory capacity to the O.P.M.

M. H. FORESTER, division manager, West Virginia division, Consolidation Coal Co., has been appointed assistant general manager of operations with headquarters at Fairmont, W. Va.

S. E. HACKETT, president of the Baton Coal Co., Pittsburgh, Pa., since Jan. 1, 1939, has severed his connection with that company, effective Feb. 6, to do his part in the national defense program. He has been appointed consultant to the steel unit of the materials branch of the Office of Production Management. He was formerly president of the Jones & Laughlin Steel Corporation.

H. JOHN HARPER, hitherto project engineer with the Koppers Coal Co., has been appointed assistant to the general manager of mines. He has been with the company since 1934, when he was employed as an engineer. He has the degree of Bachelor of Science in Mining from Carnegie Institute of Technology and that of Engineer of Mines from the University of Pittsburgh.

GEORGE R. HIGINBOTHAM, associated with the office of the general manager of operations, Consolidation Coal Co., has been named division manager, Pennsylvania division, vice L. H. Schnerr, transferred.

F. H. HULL, acting superintendent, Toms Creek mine of the Virginia Iron, Coal & Coke Co., Toms Creek, Va., has been appointed superintendent.

ELMER C. LUSK has joined the technical staff of Battelle Memorial Institute, Columbus, Ohio. He is assisting with various coal preparation and ore dressing investigations at the Battelle laboratories. He is a graduate of Muskingum College and formerly was associated with the Jeffrey Mfg. Co.

DAVID MORGAN, formerly with the Vesta Coal Co. and the Wilson Coal & Gas Co., has

LOWERS TEMPERATURES IN JOY LOADER GEAR CASES

● THE DEVELOPMENT of Superla Mine Loader Grease typifies the interest Standard Oil has in your mine operating problems. It is one of many products designed to eliminate one particular lubricating problem. In this case the problem is the lubrication of clutches and gears of Joy Loaders using semi-fluid grease.

In developing these products, regardless of how well they theoretically meet the conditions under which they will operate, they must pass rigid tests, under actual operating conditions.

After a test of Superla Mine Loader Grease, an Indiana mine Superintendent writes: "We have conducted several experiments with various greases for lubrication of our Joy Loaders.

"Standard Oil Company Lubrication Engineers assisted our personnel in conducting tests under actual operating conditions in the mine to determine temperatures and consumption.

"We have now used the new Superla Mine Loader Grease for one year and find this lubricant to be entirely satisfactory. We are not only able to operate at lower temperatures but also with a materially reduced consumption."

Why don't you let a Standard Oil Engineer recommend one or more of these tested mine lubricants? See if he can't reduce your lubrication or maintenance costs. Just write Standard Oil (Indiana), 910 South Michigan Avenue, Chicago, Illinois for the Engineer near you. In Nebraska write Standard Oil Company of Nebraska at Omaha.

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SUPERLA MINE LOADER GREASE

STANDARD OIL COMPANY (INDIANA)

ING...LUBRICATION ENGINEERING...LUBRICATION ENGINEERING...LUBRICA

become associated with the Ten Mile Coal Co., Fredericktown, Pa., through acquisition of a one-third interest.

L. H. SCHNERR, division manager, Pennsylvania division, Consolidation Coal Co., has been made division manager of the West Virginia division, vice M. H. Forester, promoted.

CAPTAIN JOHN W. SMITH has been appointed general manager of the Bellemead Coal Co., Sabine, W. Va. He also retains supervision of his own operation, the Black Eagle Smokeless Coal Co.

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Mines Bureau Praises and Blames Company in Raleigh Blast

A match struck to light a pipe or cigarette probably ignited gas and caused the deaths of nine men in an explosion in Raleigh Coal & Coke Co. mine at Beckley, W. Va., the U. S. Bureau of Mines reported on Jan. 28. Investigators for the Bureau reported that they found burnt matches beside instruments of an engineer employed by the company in surveying the workings.

Smoking, the Bureau declared, had been permitted in the mine, which had been listed as free from gas. "Probably every man in the mine at the time carried matches," the report added, condemning the practice of smoking in any mine.

The report praised the company's previously good accident record and its plans for rock-dusting, but condemned maintenance of the haulageway on return air, partial use of black blasting powder, lack of telephone communication between the inside of the mine and the surface, and failure to prevent matches and other smokers' articles being taken underground.

"Every mine is potentially a gassy mine," the investigators reported. "While this mine had operated for about 40 years and no gas ever had been reported, the occurrence of this explosion and the fact that gas was found following the explosion indicates that any so-called non gassy mine can liberate gas. If this mine had been properly rock-dusted, coal dust would not have entered into the explosion and probably a fewer number of lives would have been lost."

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Black Hawk Plant Burns

Fire of undisclosed origin on Feb. 10 destroyed the tipple and preparation plant of the Black Hawk Coal Co., 15 miles south of Terre Haute, Ind., with an estimated loss of $200,000. The mine employs about 300 men.

•

Illinois Short Course Set

The sixth short course in coal utilization at the University of Illinois, Urbana, is to be held on May 21–23. This course, sponsored by the department of mining and metallurgical engineering and under the direction of Prof. H. P. Nicholson, is given to promote the use of coal as a fuel and to disseminate knowledge concerning its preparation, utilization and marketing.

Deploring Smear Campaign, N.C.A. Attacks Federal Mine Inspection Bill

DEPLORING the tactics of proponents of the federal mine inspection bill in smearing the safety record of the industry and "falsely claiming that the bill will stop accidents and save lives," John D. Battle, executive secretary of the National Coal Association, issued a statement on Feb. 8 in behalf of the bituminous coal operators. The statement is as follows:

"The producers of bituminous coal are intensely concerned with safety and accident prevention and are united in their desire to do everything within human power to minimize the hazards that are implicit in the mining of coal. The facts and the record bespeak the continuous and whole-hearted cooperative efforts of the producers, State agencies and the U. S. Bureau of Mines, and the hundreds of millions of dollars that have been expended to reduce fatalities and the number and severity of injuries. The record of progress over the long term is impressive and unimpeachable.

"But this record and the real facts count for nothing with the proponents of the proposal to superimpose on top of the existing agencies and the existing U. S. Bureau of Mines a new federalized bureaucratic compulsory mine inspection system. The proponents have sought to capitalize the series of severe explosions and the resulting fatalities in coal mines during the past year to distort the record and to smear the industry and State safety agencies, and to put over the federal mine inspection bill on the crest of the wave of public concern and sympathy naturally evoked by these mine disasters.

"The six mine explosions occurring during 1940 rated as major disasters by the U. S. Bureau of Mines took a toll of 276 lives. This loss of life is deeply deplored by every responsible mine operator, and spurs them to intensified efforts to guard against accidents of this character or indeed of any character.

Blame Nowhere Placed

"But the fact remains that the most exhaustive investigations by both the State authorities and by safety engineers of the U. S. Bureau of Mines of all the attendant circumstances with respect to these six explosions failed in every instance to uncover any conclusive evidence as to what had caused the ignition of the gas or dust, or where the blame, if any, rested. The safety recommendations subsequently submitted by the U. S. inspectors admittedly could not afford any positive immunity from explosions.

"The reports of the federal inspectors in almost every case contained commendation of the mine management for their safety practices—in several instances the highest praise. In three cases the presence of matches or cigarettes, or both, led to the surmise that the violation by some workman of the cardinal rule against smoking underground was the cause. In no instance was there the slightest claim that one or a dozen inspections, State or federal, would have served to prevent the explosion or to have saved the resulting loss of life.

"In the case of the explosion at Bartley, W. Va., in January, 1940, the Bureau of Mines inspectors reported that 'the evidence does not justify the drawing of definite conclusions as to the ignition cause or the place of origin.' The inspectors noted the finding of cigarettes on the body of one of the victims and theorized as to the possibility of a lighted match—a failure in the human factor—ignited the gas. The report commended the safety practices of the management of this mine and its previously fine safety record.

"In the case of the disaster at Willow Grove, Ohio, in March, the State inspectors reached the conclusion that an explosion of the powder magazine precipitated the gas explosion, but what caused the powder magazine to explode was conjectural. The U. S. Bureau of Mines investigators rejected this theory, and gave it as their opinion that the explosion was attributable to the firing of a shot of black powder which in turn ignited a cloud of coal dust. This was admittedly hypothetical.

Safety Practices Praised

"At Willow Grove as at Bartley the inspectors commended the safety practices of the company and the higher-than-average rating that the mine had enjoyed on the basis of past experience in freedom from accidents and injuries.

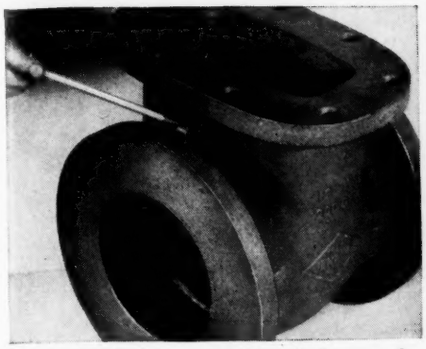
"The explosion at Sonman, Pa., in July, occurred at a moment when 350 men were in the mine. Two hundred and eighty-seven escaped unscathed, but 63 miners were imprisoned and asphyxiated before rescuers could effect their release. The investigators reported that the probable cause of the explosion was the ignition of gas by an arc or spark from the trolley of an electric locomotive underground. But of this there was no proof.

"The report of the U. S. Bureau of Mines on the explosion in a mine in Arkansas, in August, which cost ten lives, concluded that there was no certainty as to the cause, that it might have been due to the ignition of gas by an electric arc or ignition by the flame of a match. Smoking materials were found on several of the victims.

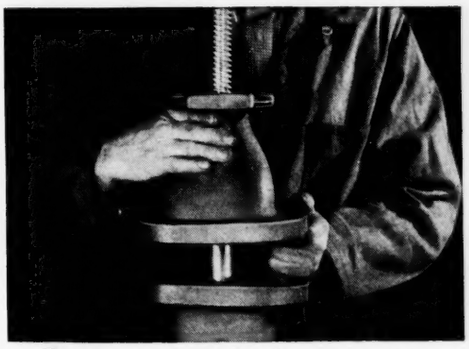
"An explosion in November in a mine at Cadiz, Ohio, with the loss of 31 lives, was said to have been attributable to the ignition of gas by an electric spark or arc, either from an electric drill or from a mining machine. But this was conjectural. The report signed by four inspectors from the U. S. Bureau of Mines recited that this mine was operated with a higher-than-average regard for safety.

"The explosion in December near Beckley, W. Va., in which nine miners were killed, was another instance in which burned matches were found on the scene, and in which the federal inspectors theorized that possibly 'the engineer attempted to smoke, and ignited the gas.' In this, as in the previous instances, the inspectors commended the mine management for its good accident record and for its approved safety practices.

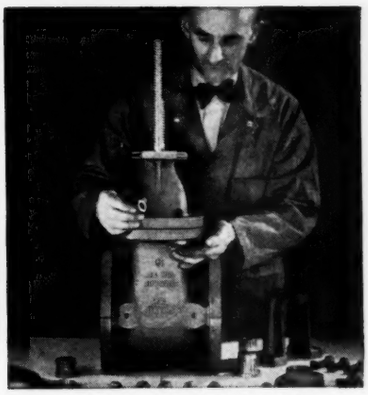
"The aggregate loss of 276 lives in these mine explosions is tragic enough, but the



1 Look at that heavy reinforcing rib—just one of many extra strength features you get in this liberally proportioned, semi steel body—average tensile strength 35,000 per sq. in.—which has six blind bosses for by-passes and drains.



2 Now note the *depth* and generous proportions of this bonnet—to allow the wedge to lift entirely out of the line of flow.

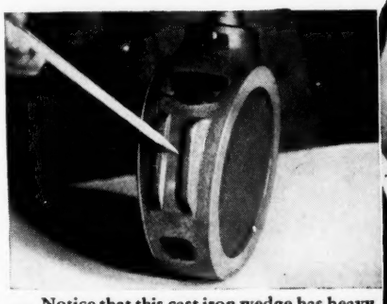


3 Eight of these sturdy *through bolts* on our 6" valve make it an easy job to remove the bonnet for maintenance or cleaning. No trouble with broken or corroded studs.

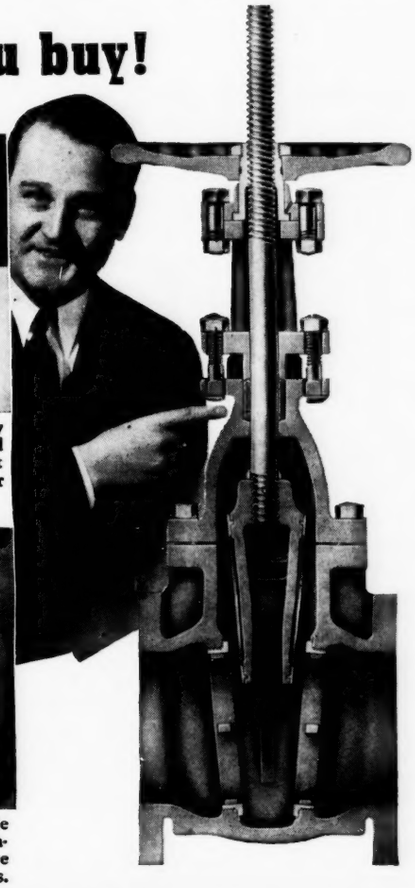
Don't Guess —

look inside this Iron Gate before you buy!

4 See this substantial Yoke—deep enough to prevent spindle threads from entering the packing chamber when wedge is completely lowered.



5 Notice that this cast iron wedge has heavy bronze face rings—*rolled in*, then machined to gauge. Also—deep guide channels that insure alignment and minimize chatter when valve is partly open.



6 Put a gauge on either of the renewable bronze seat rings to check the watch-movement precision with which they are made—and screwed into body in all sizes.

Improvements in Gate Valve design have created many differences that you should know about . . . Check over the features of this O. S. & Y.—I.B.B.M. Gate—JENKINS FIG. 651.

It will pay you to get the facts about Jenkins Iron Body Gate Valves. Compare the improved design, construction and convenience features shown in the photos. Then consult the clear-cut section view that shows how Jenkins gives you *reserve* strength at every possible point.

For example—the extra length spindle with deep, liberal threading—of correct pitch and lead for a practical balance between speed and ease of operation. Notice the husky bronze yoke sleeve with a maximum of threads engaging the spindle—for longer, trouble-free service. Also, the heavy cast iron packing gland—and many other features to which no photos would do justice.

So why not inspect the valve itself. See why Jenkins means *top-quality*. Yet they *cost no more*. Prompt delivery from stock at reliable supply houses everywhere.

JENKINS BROS., BRIDGEPORT, CONN.

LOOK TO *Jenkins* FOR THE BEST IN VALVE DESIGN

proponents of the federal mine inspection bill in reckless disregard of the truth are now asserting that more than 1,600 miners have met their death in mine explosions since January, 1940.

"The truth is that the total number of fatalities in coal mines—anthracite as well as bituminous—from all causes, during 1940, as reported by the U. S. Bureau of Mines, is way below 1,600. Secretary of the Interior Ickes, in a public letter a few days ago, put the 1940 total at 1,337.

"The fact is that the loss of life in these mine explosions in 1940 comprised only 21 per cent of the total fatalities.

"The fact is that in only five years in the past 35 years were the total fatalities in coal mining less than in 1940.

"The total fatalities last year, 1,337, compare with 1,413 in 1937 and 1,342 in 1936. Back in 1930 the total fatalities were 2,063.

"The record shows that the succession of serious explosions during the past year was abnormal, and Secretary Ickes concedes that but for the fatalities in that category, the 1940 safety record was the best in two decades.

"It is pertinent to recall that the *United Mine Workers' Journal* 20 years ago reported that 'an outstanding feature of the coal mining industry in the year 1920 was the marked decrease in the number of fatal accidents.' The total fatalities in 1920, according to the U. S. Bureau of Mines, was 2,272.

Miners Extol Safety Record

"It is pertinent to note that as recently as April 1, 1940, a newspaper advertisement extolling the virtues and accomplishments of the United Mine Workers, and paid for by that organization, contained the declaration that 'Working conditions have been vastly improved. There is a greater degree of safety in the mines today than ever before.' The explosions at Bartley, W. Va., and Willow Grove, Ohio, were past history at the time of the publication of this advertisement.

"The United Mine Workers know, as the mine operators know, and as Congress and the country ought to know, that in every State where coal is mined there are State laws and State agencies pertaining to inspection, to safety, and to accident prevention; that the U. S. Bureau of Mines, created by act of Congress in 1910, has worked steadfastly for 30 years in complete cooperation with the State departments and the industry to improve mining conditions and decrease the accident toll. While lacking police or regulatory authority, vested by State laws in State departments, the Bureau has functioned well and has contributed in large measure to the progress in mine safety that has been achieved.

"No representative of the U. S. Bureau of Mines is denied access to a mine or to mine records. No investigation by the Bureau is impeded in any way. Reports by the Bureau of the results of its investigations are now public documents. No further act of Congress is requisite if the only desire is mine inspection and publication of reports.

"If federal inspections by the U. S. Bureau of Mines and publicity would put a stop to mine accidents, as is pretended by the proponents of the inspection bills now before Congress, all that is needed is to give the Bureau larger funds. The mine operators in fact are on record as favoring greatly increased appropriations for the Bureau, but with no claim that it is the cure-all for the hazards of coal mining.

"The only remedy is the slow but steady technological advance in mining operation, coupled with progressive training of the miners in safety, and never ceasing vigilance on the part of mine management, aided and abetted by stepping up the efficiency of mine safety agencies in any states where they may be backward or inadequate, and full cooperation in the future as in the past with the Safety Division of the U. S. Bureau of Mines.

"In the present discussions in Congress, and in the press, on the subject of coal-mine explosions and accident prevention, it may be pertinent to note that:

"Major explosions in coal mines decreased 90 per cent in the 30-year span 1910–1939.

"Of all of the accidental deaths in the United States in the course of a year, less than one in one hundred occurs in a bituminous coal mine.

"There are five times as many fatalities every year on the farms as in bituminous coal mines.

"For every workman who lost his life in a bituminous coal mine in 1939, 36 persons suffered accidental death in their own homes."

A report of the natural resources production committee of the United States Chamber of Commerce on Feb. 6 opposes any transfer of responsibility for coal-mine safety from the States and existing State agencies to the Federal Government and suggests that such a move might hurt, rather than help, the cause of safety and accident prevention. James D. Francis, president, Island Creek Coal Co., is chairman of the committee, whose report says in part:

"The primary purpose in establishing the U. S. Bureau of Mines (in 1910) was to promote health and safety in mining, and to that end it is authorized to conduct studies, make investigations, carry on experiments, and issue reports with recommendations to mine operators and State officials.

"Legislation now before Congress, however, would change the principle of assistance to the coal mining industry and to State agencies that the Federal Government, through the Bureau of Mines, has been following, to one of ultimate assumption by the Federal Government of responsibility for health and safety in coal mines from the States and their agencies to a central federal office.

"Such transfer of responsibility would be accompanied by a centralization that might well result in a decrease of safety which is necessarily dependent on local support and prompt action."

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Reeds Open New Mine

A new mine has been opened by the Reed brothers on the left fork of Beaver Creek, near Drift, Ky. When the mine reaches full production about 360 men are to be employed. A spur is being constructed by the Chesapeake & Ohio Ry. from its branch line at Drift to the coal property. For the most part, coal will be hand-loaded.

C. D. Reed, president of the company, and his brother, B. F. Reed, have been operating the Turner Elkhorn and Sampson Elkhorn companies, within a four-mile radius of Drift.

•

Discuss Electrical Insulations Of Fibrous Glass

Glass is a part of the electrical insulation problem and not the alpha and omega of motor insulation, said J. R. Thumm, research laboratories, Owens-Illinois Fiberglas Corporation, speaking Feb. 14, at Charleston, W. Va., at a meeting of the West Virginia Section of the American Institute of Electrical Engineers. He showed sound pictures of the manufacture of fibrous glass for electrical insulation, special fabrics and heat insulation, then discussed the characteristics of fiber glass compared to asbestos and cotton as structures for building these electrical insulations.

Although, as he pointed out, glass in its solid form is an excellent insulator and was used freely in the early application of electricity—the Leyden jar and knob and pin insulators as instances—a flexible glass insulator must be fibrous, requiring that the spaces between be filled with varnish or other plastic material, as is also true of asbestos and cotton insulations. Therein lie the limitations to the degree of prolonged higher temperatures that the fiberglas insulation will stand compared to cotton insulation. According to Mr. Thumm, the acceptance of fiberglas during its three years of availability has been "wonderful," and the search is on for new impregnating materials which will add to the scope of applications.

Glass Can Die No More

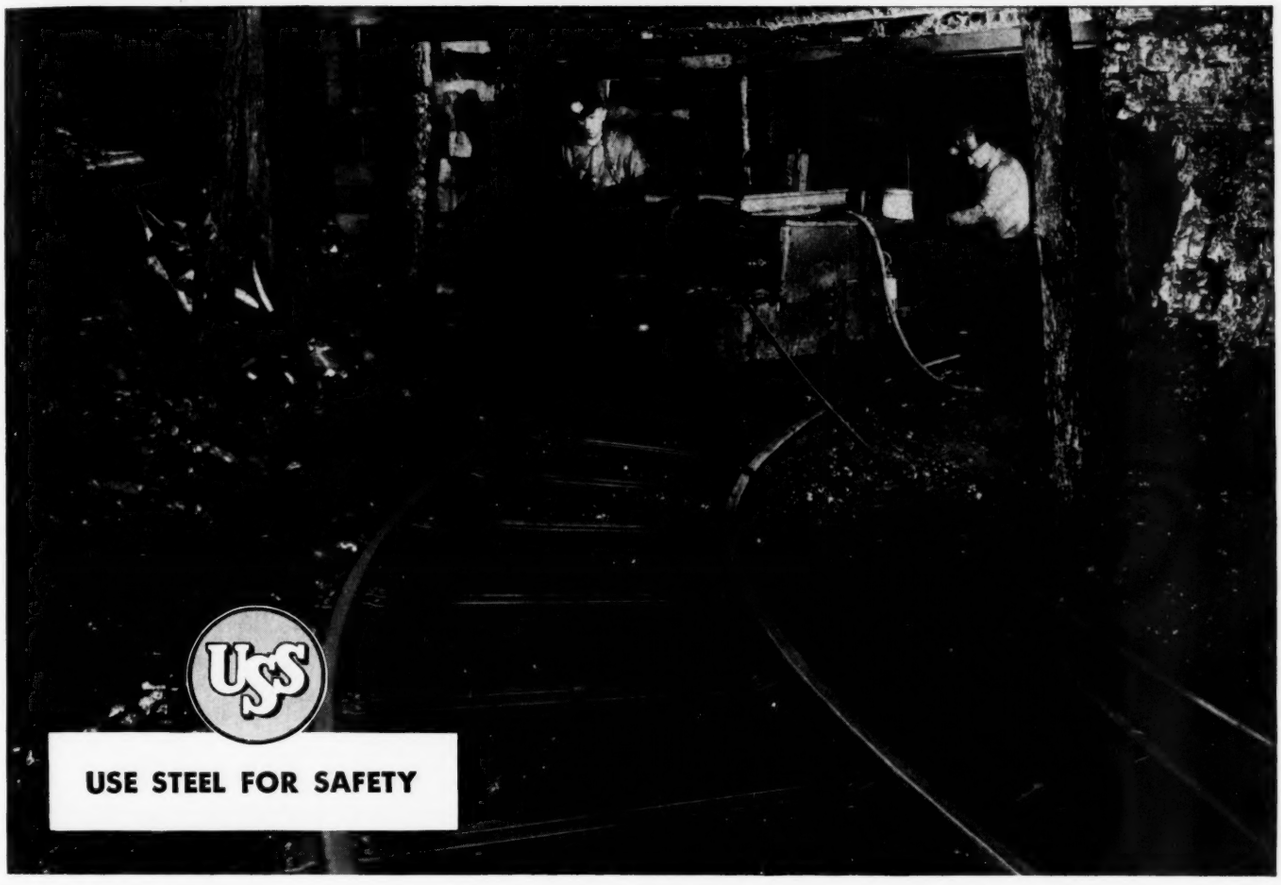
He stressed the permanance of glass as an inorganic, or "dead," insulation which cannot "die again" compared to organic, or "living," materials for which a "death" is implied. Until the advent of fibrous glass, mica and asbestos were the only flexible inorganic materials available for electrical insulation. Fiberglas leads the other insulating-material structures by being nonhygroscopic. Water which may collect on the outside of the individual fibers from condensation or immersion can be driven off rapidly and the duration of immersion has little effect on the total water temporarily retained.

Tensile strength per unit area of very fine glass fibers (on the order of 2/10,000 in. diameter) approaches close to a basic strength of 360,000 lb. per square inch, thus exceeding the strength of the best steels. As diameters are increased to about 1/1,000 in. the strength per square inch drops rapidly, then with further increases in diameter drops slowly. Thus it is evident why fibers of very small diameter are used for making glass fabrics, but in making and working these very fine fibers a manufacturing cost accumulates which brings the price of these fabrics to several times that of cotton.

Because glass has little extensibility, a varnish film of impregnation and covering is not broken by tension, thus not destroying the insulating quality until that tension reaches a point to break the whole structure.

Other data presented by Mr. Thumm indicated improved insulation thermal con-

SAFE TRACK Speeds Up Mechanized Mining with all the strength of all-steel construction



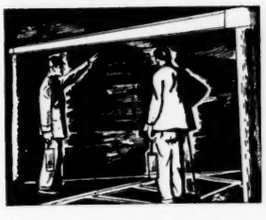
U·S·S Steel Ties assure safe and rapid movement of heavy equipment. Derailments are substantially reduced as the track is held in permanent alignment—gaging is automatic. There can be no spreading or "rolling over" of rails. Their sectional design prevents buckling.

Their shallow depth makes them ideal for room track—no trenching is required. And their wide bearing surface prevents sinking in soft bottoms or crushing on hard spots, giving ample support for heavy loads.

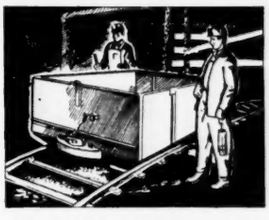
Laying time is less when steel ties are used — maintenance is lower. They are light, portable, easily laid with few tools. When necessary whole sections of track can be moved without dismantling. And steel ties are not worn out by spike holes, require no special treating.

Plan now to take advantage of the economies of all-steel track. U·S·S Steel Ties are available in a complete range of sections.

HOW STEEL INCREASES PROFITS



U·S·S STEEL ROOM TIMBERS *pay for themselves by increasing production efficiency. Their longer spans allow a wider room, so that expensive cutting machines can be operated at full capacity. They are safe, too—will bend but not break. Permanent, they may be re-used.*



U·S·S MINE CARS, *made in any size or type, are designed for maximum capacity. When constructed of U·S·S High Tensile Steels weight is reduced, payload increased and upkeep lowered. Because of their greater corrosion resistance and stamina they increase operating profits.*

SPECIAL STEELS FOR MINE USE. *Carnegie-Illinois has the right steel for every purpose. U·S·S* COR-TEN *to resist corrosion or reduce weight; U·S·S* MAN-TEN *to increase strength without adding weight; U·S·S Abrasion Resisting Steel for severe abrasive conditions.*

CARNEGIE-ILLINOIS STEEL CORPORATION

Pittsburgh and Chicago

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
United States Steel Export Company, New York

UNITED STATES STEEL

ductivity by using glass fiber structures and also a freedom of glass from any effects from corona. He mentioned that two manufacturers have gone so far as to build reduced frame size motors, glass insulated. As to maximum temperatures possible with glass, Mr. Thumm cited successful experiments to the point of a dull red glow in the dark. Alternate cooling and reheating to such high temperatures, however, causes rapid deterioration.

In discussion, P. M. Barlow, West Virginia Engineering Co., Charleston, observed that in coal mining, applications of fiber glass are meeting with success at mines where the standard of maintenance is high. He warned that the new material is not a cure-all for electrical difficulties arising primarily from low standards of operation and equipment maintenance.

•

Advisory Committee Favors Extension of Coal Act

A resolution favoring extension of the Bituminous Coal Act of 1937, as provided for in Senate Resolution S.J. 32 and House Resolution H.J. Res. 101, was unanimously adopted Feb. 21 by the advisory committee to the Bituminous Coal Division, Department of the Interior. This group, composed of representatives of the employees and producers of the bituminous coal industry, was recently appointed to advise pertaining to matters of general policy under the administration of the Coal Act.

The committee comprises the following: Representatives of the United Mine Workers—Thomas F. Kennedy, secretary-treasurer; Major Percy Tetlow, A. D. Lewis, John T. Jones and Welly K. Hopkins, general counsel. Representatives for the producers—George W. Reed, vice-president, Peabody Coal Co.; E. C. Mahan, chairman of the board, Southern Coal & Coke Co.; L. E. Woods, president, Crystal Block Coal & Coke Co.; Douglas Millard, manager of sales, Colorado Fuel & Iron Corporation, and Charles O'Neill, president, United Eastern Coal Sales Corporation.

Prior to adopting the resolution, the committee reviewed the present condition of the bituminous coal industry, both in foreign countries and in the United States, and authorized the following statement:

"It is to be noted that in every major coal producing country, with the exception of the United States, the coal industry has been either nationalized or subsidized by the various governments. It is the opinion of the committee that the American coal industry can be saved from such measures as cash subsidies or nationalization if the present Coal Act is extended for a further period of two years in order to properly observe the results of its operation under varying conditions.

"Due to the problems involved and the magnitude of the task, minimum prices equal to cost of production were established and made effective October 1, 1940. Since the establishment of prices, the Act has been effectively administered, and with the passage of the resolution for the extension of the act for two years the continuation of its successful administration will be insured. For the first time in a period of more than fifteen years, the industry is realizing its cost of production due to the fact that destructive 'cut-throat' competition that was the rule under open competition has been eliminated. The Act will continue this beneficial influence.

"The extension of the Act will protect the tremendous investment that has been made in the bituminous coal industry, a large portion of which is owned by small business men of limited means, and will tend to conserve the national resources of the country which were being wasted under open competition.

"A continuation of the Act for a further two years will protect the livelihood of and guarantee a living wage to those who are dependent upon the industry for a living, and will mean that no more 'ghost towns' will grow up, or will be caused by starvation wages due to selling coal below cost of production. It will go a long way to prevent strikes and lockouts in this basic and hitherto strife-torn industry.

"Such an extension of the act will unquestionably be of great benefit to the country's national defense program by giving the government some supervision over the production and marketing of bituminous coal and close contact with representatives of the industry and with all persons engaged in the production of coal. The industry is represented in the administration of the act by 23 district boards scattered throughout the country which are composed of members elected by all producers and employees, and which boards cooperate with the government in carrying out the provisions of the act. Therefore, the operation of the act has organized this industry to a very great degree and it is now able to meet its responsibilities in the national defense program more effectively than any basic industry in the nation.

Prices Were Not Based on Quality

"Prior to the establishment of minimum prices, consumers were charged different prices for coal of the same quality, and great inequalities existed between and among consumers as a result of price-cutting and charging one consumer more than another for the same quality of coal. Under the act as presently administered, every consumer has an equal opportunity to purchase the grade and quality of coal that he needs at the same price as any other consumer.

"The interest of the consuming public is fully protected by the office of the Consumers' Counsel Division, which is ever alert to eliminate inequalities or injustices that may arise in the price of coal for various consumers, and whose duty it is to advise consumers concerning problems which arise pertaining to prices of coal as established under the act.

"An extension of the act will be of great assistance to the owners and the employees of the industry in negotiating a new wage agreement on April 1, 1941, when the present agreement expires.

"Frequently the passage or extension of an act such as the Bituminous Coal Act raises the objection that the cost of its operation further increases governmental expense and thereby places an additional burden upon the public. The Bituminous Coal Act of 1937 is unique as it is the only act of its kind by which the entire expense of administration does not cost the government or the taxpayers a single cent. The entire cost of administering the act, including the cost of maintaining all personnel, is borne by a special assessment of 1c. per ton on coal paid by the producer of bituminous coal. The taxes collected under the act have provided a surplus or additional income to the Federal Government. The figures show that during the life of the act to April 26, 1941, the government will have collected $15,111,524 from the industry and the expense of administering the act has amounted to $12.954,801. It is to be noted that the income thereby exceeds the expense by $2,156,723. The U. S. Treasury Department is the authority for these figures."

•

Production of Coke Soars With Defense Program

As the national defense program has gained momentum coke production has shown a marked increase, preliminary figures for 1940 by the Coal Economics Division, Department of the Interior, showing a rise of 100 per cent in beehive coke output and of 25.6 per cent in that of by-product coke.

Tonnage figures show byproduct still far in front, with total output for the year 53,859,585 tons, compared with 42,882,300 tons in 1939. Low month in output for the year was April with 3,984,347 tons, whereas December was high with 4,890,030 tons. Beehive output for the year totaled 2,888,000 tons, against 1,444,300 tons in 1939. Production, which in April was 102,400 tons, had climbed to 462,900 tons in December.

•

Seven Men Killed in Explosion At United Electric Plant

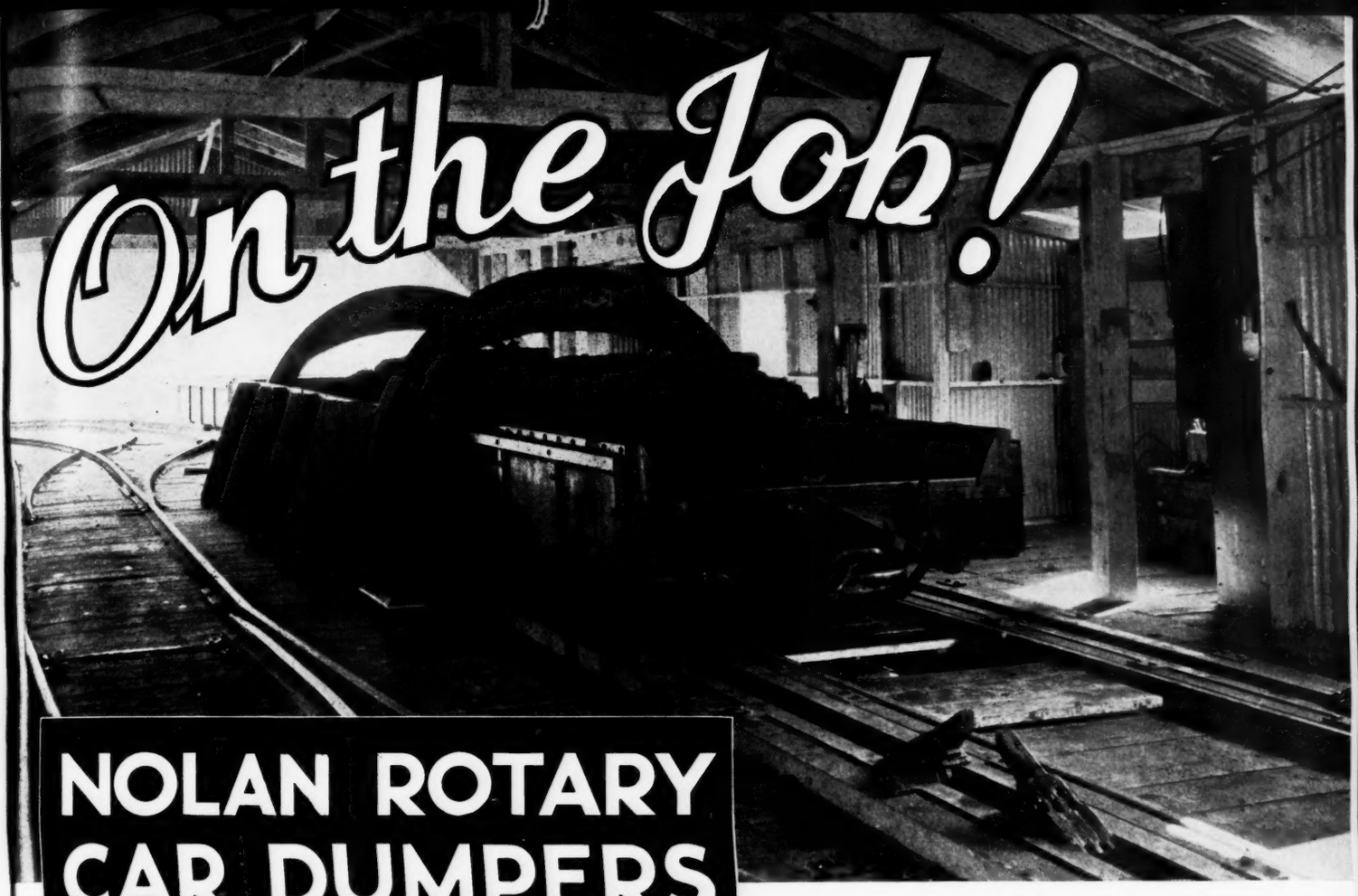
Seven men were reported killed Feb. 14 in an explosion at the liquid oxygen plant of the United Electric Coal Co., near Duquoin, Ill. The blast, which occurred about 9:15 a.m., was felt as far away as Herrin, Carterville and Carbondale. Among the dead is Lew Barker, superintendent of the plant, which manufactures liquid oxygen used to impregnate carbon cartridges, used to blast the coal.

An official of the company said the cause of the blast was undetermined. He termed it "strange," because the men were working to the east of the plant and would have been blown eastward if the explosion occurred inside the two-story frame building. However, they were blown westward, indicating that the blast occurred outside the plant. Damage, estimated at more than $75,000, included a storage building 100 ft. south of the plant. The mine was not damaged.

•

McNally Absorbs Rheolaveur

Koppers-Rheolaveur Co., Pittsburgh, Pa., manufacturer of coal-preparation equipment, has been acquired by and merged with the McNally-Pittsburg Mfg. Corporation, Pittsburg, Kan., and will hereafter be the eastern division of the latter organization.



NOLAN ROTARY CAR DUMPERS

ON THE JOB—in modern mining operations in every important coal producing area throughout the United States! And Nolan Rotary Car Dumpers ***stay on the job***—saving time, saving labor and saving coal—because they are right in principle, quick and positive in action and super-strong!

Nolan Rotary Car Dumpers are built for the toughest kind of hard service, and plenty of it. Without heavy shock or strain on car or dumper mechanism, and with a minimum of degradation to the coal, these sturdy, powerful dumpers handle their loads with clocklike precision, ***sharply cutting production costs every hour they operate.***

3 CARS PER MINUTE -- COUPLED OR UNCOUPLED

Nolan Rotary Dumpers make completely practical the use of rigid, solid-body mine cars. If desired, these powerful, dependable, easily controlled dumpers can be furnished to handle two cars or more at a time. For speed, safety and enduring service Nolan is emphatically the dumper to buy. Push button or master control lever makes it an easy, one-man job to handle the dumping operation. The dumper turns 360°, discharging all material cleanly and then stops automatically in upright position, safely locked by positive rail-aligning stop.

Write today for complete information on Car Dumpers of any type—for any operation; also Automatic Cagers, Feeders, Car Stops and other Mine Car Control Devices.

The NOLAN CREED

The name Nolan must always mean what it has always meant to mining men everywhere — complete dependability in mine car dumping and control devices.

THE MINING SAFETY DEVICE CO.,

BOWERSTON, OHIO

John T. Ryan, Safety Champion, Passes Away

John T. Ryan, 57, president of the Mine Safety Appliances Co. and long a champion of safety legislation for coal miners, died Feb. 20 at Miami Springs, Fla. Born at Dudley, Pa., Mr. Ryan attended Juniata College and Penn State, being graduated from the latter in 1908 with a B.S. degree in mining engineering. In 1903 he was foreman of the W. H. Sweet Coal Co., Dudley, Pa.; engaged in mining engineering work at Huntington, Pa., 1908-10; became superintendent of the Rocky Ridge Coal Mining Co., and superintendent and engineer of the Langdon Coal Co., Hopewell, Pa. In 1911 he joined the U. S. Bureau of Mines at Pittsburgh, becoming rescue foreman, junior mining engineer and assistant mining engineer; in 1914 he was assistant mining engineer of the Bureau at Urbana, Ill., and in the same year helped organize the Mine Safety Appliances Co.

He worked with Thomas A. Edison at the inventor's laboratory at West Orange, N. J., in 1915, helping perfect a miners' safety lamp. He also served a term as president of the Coal Division, American Institute of Mining and Metallurgical Engineers.

•

Midwest Power Men to Meet

The Midwest Power Conference will be held April 9 and 10 at the Palmer House, Chicago. Special emphasis will be placed on national defense at this year's conference, which is sponsored by the Illinois Institute of Technology in cooperation with Iowa State College, Michigan State College, Purdue University, State University of Iowa, University of Illinois, University of Michigan and University of Wisconsin.

•

Gilberton to Have New Plant

Mahanoy Valley Coal Co., of which John B. Rich is president, has completed plans to build a preparation plant at Gilberton Pa. The plant will be equipped with Chance cones and will be supplied with output from the old Gilberton-Draper-Lawrence properties. According to an announcement by the company on Feb. 12, construction was to start within 30 days.

•

Whitney and H. L. Warner Dead

Whitney Warner, 61, well-known Ohio coal operator, died Feb. 11 at Mountain Lake, Fla. Six days later his brother, Hoyt L. Warner, 60, passed away. Both were carried off by heart attacks. Both brothers joined their father's company, W. H. Warner & Co., early in life, the elder brother succeeding his father as president of the company. Two years ago, following the death of Frank Taplin, Whitney became chairman of the board of the North American Corporation, resigning as head of the Warner organization. He remained a director, however, being succeeded as president by his brother.

John T. Ryan

New Preparation Facilities

Cornett-Lewis Coal Co., Louellen, Ky.: Contract closed with McNally-Pittsburg Mfg. Corporation to screen out minus 6 in. from mine-run and breaking plus 6 in. at rate of 150 t.p.h. to 6x0.

Scotia Coal Co., Brooklyn, W. Va.: Contract closed with McNally-Pittsburg Mfg. Corporation for McNally-Norton automatic washer to clean 3x¾-in. coal at rate of 50 t.p.h. and classify into three sizes; to be completed about May 1.

Slab Fork Coal Co., Slab Fork, W. Va.: Contract closed with McNally-Pittsburg Mfg. Corporation for Type B McNally-Norton vertical pick breaker with provision for screening out minus 7 in. and breaking plus 7 in. to 0x7 in.

Winding Gulf Collieries, Goodwill, W. Va.: Contract closed with McNally-Pittsburg Mfg. Corporation for McNally-Norton Type A vertical pick breaker with provision for screening out minus 6 in. and breaking plus 6 in. to 0x6 in. at rate of 100 t.p.h.

Winding Gulf Collieries, Winding Gulf, W. Va.: Contract closed by Kanawha Mfg. Co. with McNally-Pittsburg Mfg. Corporation for McNally-Norton Type B vertical pick breaker with provision for screening out minus 6 in. and breaking plus 6 in. to 0x6 in. at rate of 150 t.p.h.

The following contracts for new preparation facilities received by the Kanawha Mfg. Co. in 1940 arrived too late for inclusion in the list on pp. 82–83 of the February issue of *Coal Age*, and accordingly are given below:

Banner Fuel Corporation, Cranes Nest, Va.: four-track shaker screens, crusher, etc., 150 tons per hour.

Bellemead Coal Co., Glen Morrison, W. Va.: screening, conveying and mixing equipment, in addition to Kanawha-Belknap chloride washer listed in February; 100 tons per hour.

Brule Smokeless Coal Co., Otsego, W. Va.: Kanawha-Belknap chloride washer, stove coal; 40 tons per hour.

Crab Orchard Improvement Co., Eccles, W. Va.: sizing screens in addition to two Kanawha-Belknap chloride washers listed in February.

Gulf Mining Co., Crab Orchard, W. Va.: four-track wood tipple, including shaker screens, three loading booms, crusher, mixing conveyor, etc.; 250 tons per hour.

Johnstown Coal & Coke Co., Beaverdale, Pa.: screening, conveying, mixing and washing equipment for nut and stoker, including Kanawha-Belknap chloride washer; 40 tons per hour.

Kelleys Creek Colliery Co., Ward, W. Va.: three-track steel and wood tipple; 200 tons per hour.

Koppers Coal Co., Wharton, W. Va.—mixing and crushing equipment, 300 tons per hour; Helen, W. Va.—mixing, crushing and recirculating equipment, 300 tons per hour.

Lillybrook Coal Co., Killarney, W. Va.: pea-coal screening equipment in addition to Kanawha-Belknap chloride washer listed in February; 40 tons per hour.

MacAlpin Coal Co., McAlpin, W. Va.: crushing, mixing and loading equipment; 100 tons per hour.

Princess Elkhorn Coal Co., Prestonburg, Ky.: five-track tipple, including screens, picking tables, four loading booms, and mixing and blending conveyors; 150 tons per hour.

Red Parrot Coal Co., Prenter, W. Va.: crushing equipment; 60 tons per hour.

Truax-Traer Coal Co., Acme, W. Va.—crushing equipment, 150 tons per hour; Kayford, W. Va.—crushing equipment, 100 tons per hour..

West Virginia Coal & Coke Corporation, Norton, W. Va.: crushing and mixing equipment, 100 tons per hour.

•

Buys Indian Head Colliery

L. A. Harding, dealer in mine machinery, of Scranton, Pa., has purchased the Indian Head colliery, Pottsville, Pa. The new owner expects to place the property in operation again when plans have been worked out.

•

Stockton Mine Being Reopened

The Jeddo-Highland Coal Co. is reopening the Stockton No. 1 mine, in the Hazleton area of Pennsylvania. The operation has been closed since 1902. The company plans on obtaining 600 tons a day from the mine.

•

Avondale Colliery Resumes

Work was resumed at the Avondale colliery of the Glen Alden Coal Co., near Plymouth, Pa., on Feb. 3 after an idleness of six years. Work started with 300 men employed. Alex Henderson is superintendent.

At No. 9 colliery, Sugar Notch, which became active three weeks earlier after being long dormant, 100 additional workers were taken on.

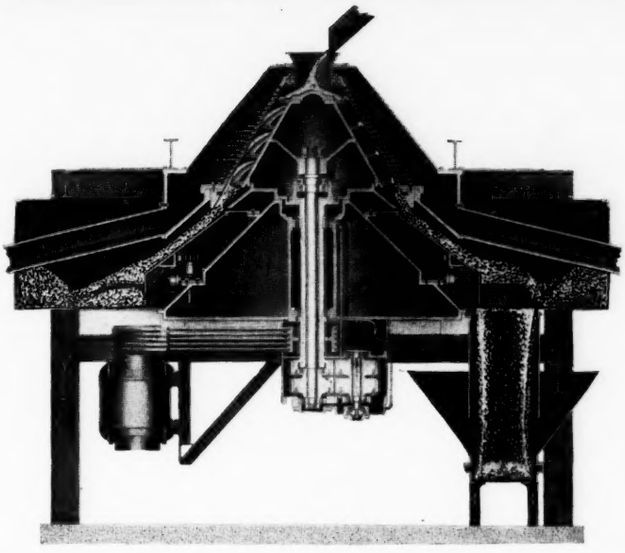
•

Research Fellowships Offered

University of Washington, Seattle, Wash., offers four fellowships for research in coal and non-metallics in cooperation with the U. S. Bureau of Mines for 1941–42. They are open to graduates of universities and technical colleges who are qualified to un-

ECONOMICAL SOLUTION

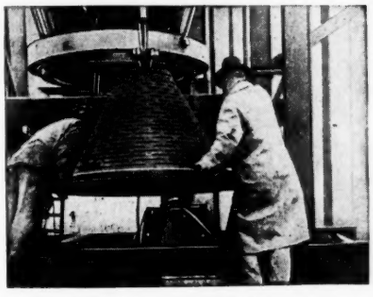
to the Problem of Coal Drying without the Use of Heat . . . .



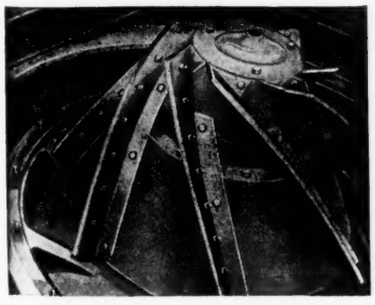
CONTINUOUS CENTRIFUGAL DRYER

Saves Waste and Increases Tonnage

- **Small size 26" guaranteed tonnage 10 to 12 tons of 5/16" minus.**
- **Large size 48" guaranteed tonnage 75 tons of 5/16" minus.**



View showing screen basket being superimposed on inner cone of 48" machine.



View showing inner cone with flights of 48" machine.

Once you put the Continuous Centrifugal Dryer to the test you will find out its great value.

Makes it possible for you to turn your sludge into a salable product at low cost.

Makes it possible to reduce moisture and ash content and remove coal from slurry, making large daily savings.

Dry your fine coal and end the problem of coal freezing during shipment.

Saves considerable in capital investment such as for equipment and buildings.

Save in coal consumed because it requires no heat —power costs are low.

Save on the maintenance cost per ton of coal processed.

Give you more tonnage while keeping costs down. Save much time and labor costs.

Write for free demonstration with mobile unit

•

A new 26" Continuous Centrifugal Dryer is mounted on a new truck for demonstration purposes. Why not allow us the opportunity to show you what this unit will do by making a free demonstration — right at your plant and under your supervision.

CENTRIFUGAL AND MECHANICAL INDUSTRIES, INC.

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dertake investigations of research character. The purpose is to undertake solution of problems being studied by the Bureau of Mines that are of special importance to the State of Washington, the Pacific Northwest, and Alaska. Payments under a fellowship are made each month and amount to $720 a year.

•

Southern Illinois Mining Electrical Group Hears Much About Carbon Brushes

DR. I. W. BRANDEL, Ohio Carbon Co., prefaced his talk on carbon brushes, before the Southern Illinois Mining Electrical Group at its Feb. 7 meeting, at West Frankfort, Ill., with these words: "This is to be a non-technical talk, but it will be no amateur performance."

"*Carbon* brush is a misnomer," he declared. Brushes were originally made of copper strips or copper gauze. Gradually carbon and other ingredients were worked in, until today Ohio Carbon Co. uses 55 different raw materials, including five kinds of copper, in the manufacture of carbon brushes. This company today uses 300 different grades of materials to assure proper commutation, and is trying out another. Other carbon-brush manufacturers do likewise. "You can't use any old thing for brush material."

Not only are numerous materials used but the method of mixing, the temperature, time and even the cooling must be controlled. In a certain case powdered cast iron failed to work, but powdered malleable iron did work. Gas-heated baking furnaces give one result and electric furnaces another.

"In a four-year course, how much time do you give to the subject of brushes?" Dr. Brandel asked 40 deans of colleges giving electrical courses. Thirty-nine answered negatively. A certain 475-page book on electric motors—half of which was devoted to direct-current motors—passed off the subject of brushes with one eleven-line paragraph. "The thing we have no respect for is the thing we know nothing about," he declared, and added: "there isn't anything published."

"Motor builders," the speaker proceeded, "design and build a motor, then hunt for a brush." Citing a hypothetical case, he said 200 motors might be built as a starter. Five brush manufacturers are asked to send samples, and each sends five grades. After extended test the 200 motors are reduced to three, and the best operating brush of the three is selected—choosing the least evils.

"What else can I do?" pleads the motor designer.

"You can't do anything else," retorts Dr. Brandel, "but the brush manufacturer can."

A tailor-made brush is the answer. In the design of a motor, he insisted, the brush is the first thing, not the last, to consider. "Every motor is a brush problem of its own," said Dr. Brandel. He pointed out a case where a competitor used 85 per cent of copper in a brush for a motor used as a generator—with bad results. Ohio Carbon Co. made a brush with 25 per cent copper, and got better results. A lot of copper proved noisy for a phonograph. A generator running at 10 per cent load requires a different brush from that operating at full load. "Only the proper mixture licks the problem." Extensive laboratory research and tests are constantly carried on by the brush industry in new materials, formulas and technique.

"There is one more problem: how and where to buy brushes. There are 3,000,000 kind of brushes. We can't make a catalog. But a reference book has been prepared by Ohio Carbon Co. This education is free, no matter whose brushes you buy." Dr. Brandel proposes to deal with competition by making the buyer a better buyer. Brushes should not be bought on price but on the service they give.

Warning against *brushes that work*, the speaker gave the following suggestions on brush selection:

1. Brush wear is not always due to mechanical wear.
2. Correct material for one condition is not necessarily correct for another condition—even on the same motor.
3. Variation in motor duty changes requirements.
4. Brush grades can eliminate all objections.
5. Hardness or softness has little to do with wear.
6. The ingredients count; also processing.
7. Testing with the hand is no criterion.
8. You can't judge by looks.
9. Circulating currents can be limited by certain brushes.
10. From a motor manufacturer is not the right way to buy a brush. A motor builder looks to his own equipment, a brush manufacturer to all machines. "That's the only way you are going to get 100 per cent operation; and on series machines you must be willing to try a second or a third time."

At the close of his formal talk Dr. Brandel showed a new burnishing tool which removes microscopic grooves from commutators and puts on a mirror polish. A data sheet indicating how much information is required to construct a correct brush for a job included the following—the secret of

Serial No. .....
Your Mach. No. .....
Location .....

Terminals

State size or diameter of screw.

Service

Motor .....
Generator .....
Exciter .....
Rotary .....
Syn. Motor .....
Crane .....

NAME-PLATE DATA

Mfr. ..... H. P.
Type ..... Style ..... KW.
Model ..... Frame ..... KVA.
Form ..... Amp. ..... Volt ..... R.P.M.

MACHINE

Commutator ..... A.C. D.C.—Voltage—A.C. D.C. ..... Secondary or Slip Ring
..... Full load in amperes .....
..... Per cent overload .....
..... No. of poles Kind of rings .....
Diameter
..... Length Width .....

BRUSHES

..... No. of arms No. of rings .....
..... No. per arm No. per ring .....

Length	Width	Thickness	No. per set	Length	Width	Thickness
Top Bevel 45 50 60 70 75		Bottom Bevel 45 50 60 70 75 80 85		Top Bevel 45 50 60 70 75		Bottom Bevel 45 50 60 70 75 80 85

..... Brush Style .....
.....
2½ 3½ 4½ 5½ 7 Length of Shunt 2½ 3½ 4½ 5½ 7
..... S—O Terminal S—O .....
..... Grade in Use .....
Remarks
.....

Commutator Condition

Clean ..... smooth ..... bright .....
dull ..... dark ..... black .....
oily ..... slots filled .....
Grooved .....
Spotted .....
Atmosphere .....

Engr. Dept.

C. D. ..... in. .....
F. P. M. .....
C. D. ..... in. .....
F. P. M. .....

BETHLEHEM BUILDS 'EM BIG

If you've got a job that calls for really big wire rope, check Bethlehem before you buy.

We've recently installed several large rope-closing machines. These machines are new, completely modern in design. They are controlled by the ace operators in our mill.

And note this fact: The steel that goes into Bethlehem wire rope is produced, from start to finish, by Bethlehem blast furnaces, open hearths, rolling mills, drawing blocks and patenting furnaces. Bethlehem controls every step.

Result? When you buy Bethlehem wire rope, whether it's large or small, you get rope that performs consistently, day after day, month after month. You get long average service . . . and after all, it's the average service that determines your rope costs.

BETHLEHEM STEEL COMPANY

BETHLEHEM STEEL

success in brush manufacture being to get the data.

Discussion brought out the following points:

1. Flat spots on slip rings usually start from oxidation when the machine is standing. Cast-iron slip rings are preferable to bronze; soft brass is very poor.

2. Percentage of load at which a machine operates is important. Partial load has a tendency to high polish, glaze, chatter and hard spots.

3. A compromise brush must be used on a machine with widely varying loads; one with no tendency to glaze, but will carry heavy loads.

4. Chocolate brown is the ideal commutator color; never remove it.

5. Light spring tension is a cause of burning. Necessary tension varies; the least that works is best.

6. Sand brushes in direction commutator turns. Remove all sand grains from the brush; otherwise commutator is cut.

7. Smearing of commutator may be due to ingredients in the brush. A cleaning material is mixed into the brush material to keep commutator clean.

8. A "V" undercut is recommended because extraneous material is more easily thrown off—particularly desirable for dirty conditions.

9. Electrolytic graphite is not usually suitable for flush mica commutators.

10. New brushes are radius-fitted at no extra charge if requested and commutator diameter is given.

•

Coal and Lumber Road Wreck Kills Four in Locomotive

George Harrison, Wellsboro, Pa., secretary-treasurer of the Tioga Lumber Co., was killed in a train wreck Feb. 12 on a logging road near Tioga, Nicholas County, W. Va., while on his way to inspect a new mine of the Tioga Coal Corporation. Three members of the train crew also lost their lives in the same accident. T. T. Rees, of Richwood, W. Va., formerly general superintendent of the Lillybrook Coal Co., is president and general manager of the Tioga Coal Corporation, which operates one mine and is opening another on the lumber company property.

•

Air Hygiene Foundation Elects

Air Hygiene Foundation, Pittsburgh, Pa., has elected V. P. Ahearn, Washington, as secretary of the board of trustees, and Theodore C. Waters, Baltimore, as general counsel; John F. McMahon has been promoted to executive secretary, according to an announcement by Dr. H. B. Meller, managing director. The foundation, with headquarters at Mellon Institute, is a nonprofit organization of industrial concerns for the conservation of employee health.

Besides Mr. Ahearn, who is executive secretary of the National Industrial Sand Association, and Mr. Waters, chairman of the Maryland Occupational Diseases Commission, the following trustees were reelected: Roger A. Hitchins, president, National Refractories Co. (chairman); Andrew Fletcher, vice-president, St. Joseph Lead Co. (vice-chairman); B. D. Saklatwalla, president, Alloys Development Corporation (treasurer); Vandiver Brown, general counsel, Johns-Manville Corporation; Joseph Dilworth, assistant to president, Westinghouse Electric & Mfg. Co.; J. Dewey Dorsett, manager, casualty department, Association Casualty and Surety Executives; Dan Harrington, U. S. Bureau of Mines; Dr. R. R. Sayers, director, U. S. Bureau of Mines; A. W. Sherwood; W. P. Yant, Mine Safety Appliances Co.; and R. E. Zimmerman, vice-president, United States Steel Corporation.

•

Harlan Mining Institute Expands Course

Harlan Mining Institute School started a new 30-weeks session on Jan. 29 at the Hall High School, Grays Knob, Ky. The course embraces 22 subjects, three of which were not offered during the first term, a year ago. No tuition fee is charged, the only cost involved being for a reference book. C. W. Mathis, principal of the school, also is director of the mining school. James F. Bryson, safety director, Harlan County Coal Operators' Association, was one of the founders of the mining course.

•

Obituary

WILLIAM G. WARDEN, 72, formerly chairman of the board of the Pittsburgh Coal Co. and prominent Philadelphia industrialist, died Feb. 23 at his winter home in Palm Beach, Fla.

JOHN H. JONATHAN, 55, a general foreman with the Susquehanna Collieries Co., Nanticoke, Pa., died Jan. 30 at his home in that city. He had been in the company's employ more than 30 years.

JAMES OWENS, 73, a member of the State Miners' Examining Board of Pennsylvania for the last 16 years, died Feb. 7 at his home in Edwardsville, Pa. He worked at the Woodward colliery of the Glen Alden Coal Co. until five years ago.

C. R. MESSINGER, 57, president of the Chain Belt Co., Milwaukee, Wis., died suddenly of a heart attack Feb. 4 at his home in Milwaukee. He had been prominent in business affairs in Milwaukee and Chicago for three decades.

RICHARD JAMES GLOVER, 39, former editor of the *Illinois Miners' Journal*, died Jan. 21 at St. John's Hospital, Springfield, Ill., after a long illness. For the last year he had been employed in the publicity bureau of the State Department of Labor.

WILLIAM R. CONLON, 55, general manager of the Conlon Coal Co., Hudson, Pa., died Feb. 13 in Tucson, Ariz., where he had gone last October in hope of regaining his health. He had been associated with his father in independent mining operations since his graduation from high school.

•

Permissible Plates Issued

Four approvals of permissible equipment were issued by the U. S. Bureau of Mines in January, as follows:

Goodman Mfg. Co.: Type 93-BO4C storage-battery locomotive; Approval 1531; Jan. 3.

Joy Mfg. Co.: Type T6-1P caterpillar truck; two 10-hp. motors, 250 and 500 volts, d.c.; approvals 417 and 417A; Jan. 6.

Goodman Mfg. Co.: Type 112-CK3 shortwall mining machine; 35-hp. motor, 500 volts, a.c.; Approval 418A; Jan. 14.

Mine Safety Appliances Co.: Type "S" rock-dusting machine; 20-hp. motor, 230 and 550 volts, d.c.; approvals 419 and 419A; Jan. 22.

•

Tax Problems Engross A.M.C. At Annual Meeting

Tax problems had the center of the stage at the annual meeting of the American Mining Congress, Mayflower Hotel, Washington, D. C., Jan. 29. Recommendations of the various subcommittees of the federal tax committee of the organization were crystallized in a "Declaration of Policy" adopted at the meeting. The necessity of an excess-profits tax was frankly recognized, but "possible sources of revenue," said the declaration, "should not be strangled by excessive taxation." In meeting the imperative needs of national defense, non-defense expenditures should be reduced and non-essential government expenditures should be eliminated.

Many of the most serious inequities in the present law, it was asserted, would be removed if amendments were made to apply to 1940 returns to cover the following points: (1) elimination of daily computations of invested capital; (2) allowing the taxpayer to postpone the election between the income credit and the invested-capital credit until final determination of tax liability; (3) revision of the special-relief provision of the statute to permit adjustment of abnormalities in base-period earnings, in invested capital and in taxable-year income to permit normal growth.

Other recommended amendments in this category would provide that: (1) The income credit should be based upon any three of the four years in the base period; (2) rates of taxes should not be graduated solely upon the dollar amounts of income, and (3) the true excess profits would be measured over a period of at least five years.

Full cooperation of the mining industry in national defense was reaffirmed. In this connection, the congress urged that the government agencies furnish the industry full information on requirements for each mineral commodity, continue stock piling of strategic and critical minerals from domestic sources with foreign purchases of such metals and minerals until the United States can supply the needed quantities. Priorities should be established only where definite shortages exist. Facilities created for national defense, it was declared, should not be used by the government "in competition with private industry for the production of peace-time goods."

The congress again went on record as

"You got us out of a bad jam" *

(It's a habit we have!)

SCULLY STEEL PRODUCTS CO.
*"I want to thank you very much for the way you handled the order I gave you yesterday over the telephone. The bars arrived the first thing this morning and got us out of a bad jam."

WE hope you'll never be in such a "bad jam" that your work is stopped or delayed by lack of steel—especially if you are engaged in the vitally important work of defense production. But whether you are or not, you'll find Scully a pleasant, reliable and prompt source of supply. Every year hundreds of letters like the one quoted above express the appreciation of gratified customers for some example of the service that has made Scully famous.

And it's a rule at each of our eight warehouses to give that kind of service to every order, large or small, rush or not. Why not see for yourself? The next time you need steel, steel products, copper or brass "call Scully—and relax."

Scully Service

The Mark of Service

ALLOYS
ANGLES, HOT ROLLED and COLD ROLLED
ARCHES (CORRUGATED)
BABBITT
BANDS and HOOPS
BARS, HOT ROLLED
ALLOYS (HR and CF)
COLD FINISHED
ELECTRIC HIGH CARBON STEEL
REINFORCING
BEAMS and C. B. SECTIONS
BEEF RAIL
BOLTS, NUTS, WASHERS, ALL KINDS
BORING and TURNING BARS and GRINDERS
BRACES, BOILER
CHAIN, ALL KINDS
CHANNELS
CHISELS
CHUCKS, STAYBOLT
CLAMPS, BOILERMAKERS
CLIPS, PATTERSON
CLEANERS, FLUE
CONDUCTOR PIPE
COPPER and BRASS
COUPLINGS, HOSE
CRAYONS, SOAPSTONE
CUTTERS
DARDELET RIVET and MACHINE BOLTS
DRILL RODS
EAVE TROUGH and FITTINGS
EXPANDERS, FLUE
FERRULES, COPPER
FLANGES, BOILER and TANK
FLOOR PLATES
GALVANIZED SHEETS, BARS, BANDS
HANDLES, HAMMER
HEADS, TANK and FLANGE
HOISTS, HAND and POWER
IRON, STAYBOLT
LUGS, BOILER, TANK and SILO
MACHINERY, HAND and POWER
MANHEAD PLATES and FITTINGS
NAILS
PACKING
PAINT STICKS
PLATE STEEL, STANDARD QUALITIES
ABRASION RESISTING
COR-TEN and MAN-TEN
PLUGS, FLUE
RAILS and FITTINGS
REAMERS
SHAFTING
SHEETS
ABRASION RESISTING
ELECTRICAL
COR-TEN and MAN-TEN
HOT ROLLED and UNIFORM BLUE
WELLSVILLE POLISHED
COLD ROLLED
STAINLESS STEEL
GALVANIZED and GALVANNEALED
LONG TERNE
CORRUGATED
U-S-S COPPER STEEL
SPRING STEEL BARS and SHEETS
STAINLESS STEEL
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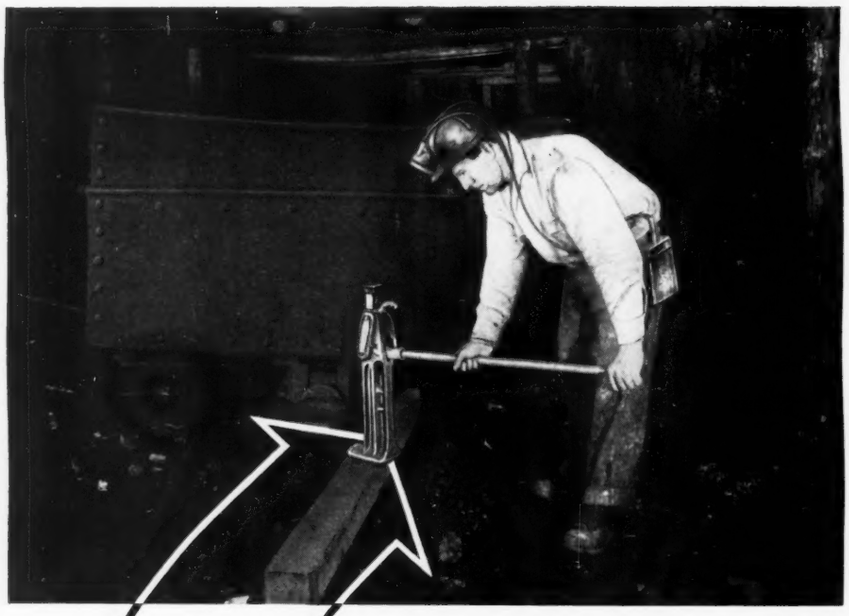
UNITED STATES STEEL



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You can't afford to have a derailed car hold up a loaded train while someone hunts a jack! You won't put up with old-fashioned ways of lifting timbers when you can use efficient, speedy Duff-Norton Timber jacks! You dare not take chances with your roofs while Duff-Norton Roof Jacks are available!

"All Out" production means that, more than ever before, you need *plenty* of dependable, efficient Duff-Norton Mining Jacks, above ground and below.

Your Mill Supplies Distributor will be glad to show you where and how Duff-Norton Jacks can help speed coal production.

THERE ARE MORE THAN 300 TYPES AND SIZES OF DUFF-NORTON JACKS

"The House That Jacks Built"

THE DUFF-NORTON MANUFACTURING COMPANY

PITTSBURGH, PA.

Canadian Plant — Coaticook, Quebec

favoring State regulation and control of mine inspection and water pollution. Amendment to both the National Labor Relations and the Fair Labor Standards acts was urged to eliminate present inflexibility and the blanketing of their provisions over the entire mineral industry "regardless of the conditions surrounding individual operations." The St. Lawrence waterway and power project was condemned as of doubtful benefit and as obstructive to true national-defense demands.

Work of the Bureau of Mines and the Geological Survey was praised. "We urge expansion of the educational work of the Health and Safety Branch of the Bureau of Mines," said the congress. Opposition was expressed to the reciprocal-trade-agreement policy "which has lowered necessary protection to the domestic mining industry without compensating advantage to the United States."

Officers elected were: president, Howard I. Young (reelected); vice-presidents: D. D. Moffat, E. B. Greene and Donald Callahan; secretary, Julian D. Conover (reelected). An advisory council of the Coal Division named for the ensuing year comprised: R. L. Ireland Jr., president, Hanna Coal Co. of Ohio (chairman); C. E. Abbott, vice-president, Tennessee Coal, Iron & Railroad Co.; C. A. Garner, vice-president, Jeddo-Highland Coal Co.; T. G. Gerow, vice-president, Truax-Traer Coal Co.; C. A. Gibbons, general manager, Susquehanna Collieries Co.; George B. Harrington, president, Chicago, Wilmington & Franklin Coal Co.; Moroni Heiner, president, Utah Fuel Co.; E. P. Humphrey, vice-president, Stonega Coke & Coal Co.; W. J. Jenkins, president, Consolidated Coal Co.; S. B. Johnson, president, Lorain Coal & Dock Co.; L. Russell Kelce, vice-president, Hume-Sinclair Coal Mining Co.; Frank F. Kolbe, president, United Electric Coal Cos.; Eugene McAuliffe, president, Union Pacific Coal Co.; Harry M. Moses, president, H. C. Frick Coke Co.; A. J. Musser, vice-president, Clearfield Bituminous Coal Corporation; E. J. Newbaker, vice-president, Berwind-White Coal Mining Co.; E. R. Price, superintendent, Inland Steel Co.; R. E. Salvati, vice-president, Island Creek Coal Co.; Henry P. Smith, president, Princeton Mining Co.; J. Noble Snider, vice-president, Consolidation Coal Co.; K. A. Spencer, vice-president, Pittsburg & Midway Coal Mining Co.; D. R. Swem, manager of coal operations, Northwestern Improvement Co.; R. E. Taggart, president, Philadelphia & Reading Coal & Iron Co.; T. J. Thomas, president, Valier Coal Co.; and L. E. Young, mining engineer.

•

More Research Appointments Offered at Battelle

Further appointments of research associates are to be made at Battelle Memorial Institute, Columbus, Ohio. Those eligible are university or college graduates showing exceptional aptitude for research, preference being given to those who have majored in physics, physical chemistry, organic chemistry, chemical engineering, metallurgy, fuels or ceramics, and especially to those who have completed Ph.D. training.

Appointment as research associate is for one year, and may be extended for a

second year, the salary being $1,800. Research associates work full time on approved research projects under supervision of Battelle's technical staff. Projects assigned are fundamental or general, leading to publication of information that will be useful to science and industry. Application should be submitted not later than April 1 to Clyde E. Williams, director.

•

Louisville Names Committee To Study Smoke Evil

A smoke committee composed of representative citizens has been appointed by Mayor Joseph D. Scholtz of Louisville, Ky., to make a study of the effort for smoke elimination in St. Louis. Osburn Monnett, a combustion engineer, has been employed to investigate and offer suggestions for reducing "smog." George M. Eady, general contractor, is chairman of the committee.

•

Ohio Mine Officials Die In Automobile Crash

Two Ohio coal-mine officials met death on Feb. 9 when an automobile in which they were riding crashed into a tree near Moundsville, W. Va. State police identified the victims as Joseph Williams, 42, superintendent of the Powhatan Mining Co., Powhatan Point, Ohio, the driver, and James Stewart, assistant superintendent of the same company.

•

Republic to Rehabilitate Old Operation

Republic Steel Corporation is rehabilitating the old Virginia coal mines, acquired in the merged properties of the Gulf States Steel Co. a number of years ago, and will place the mine in operation as soon as practicable. The mine is on the Blocton branch of the Louisville & Nashville R.R. about 20 miles from Birmingham, Ala., and there is said to be a large area of virgin coal, besides stumps and pillars in the old workings.

A slope opening to the American seam has been idle for about ten years, but a maintenance crew has been in charge, and officials state that the mine can be gotten in shape for production in the near future. A new tipple is in course of construction, but the only preparation of the product is to be crushing, and the output will then be shipped to the company's furnace and coking operations at Thomas, Ala.

•

West Kentucky Wins Decision In Rate Controversy

A proposal by railroad and mine operators to reduce previously authorized minimum freight rates on bituminous coal shipped from districts in Illinois and Indiana to Chicago for transshipment as lake cargo was rejected by the Interstate Commerce Commission on Feb. 19. The Commission found

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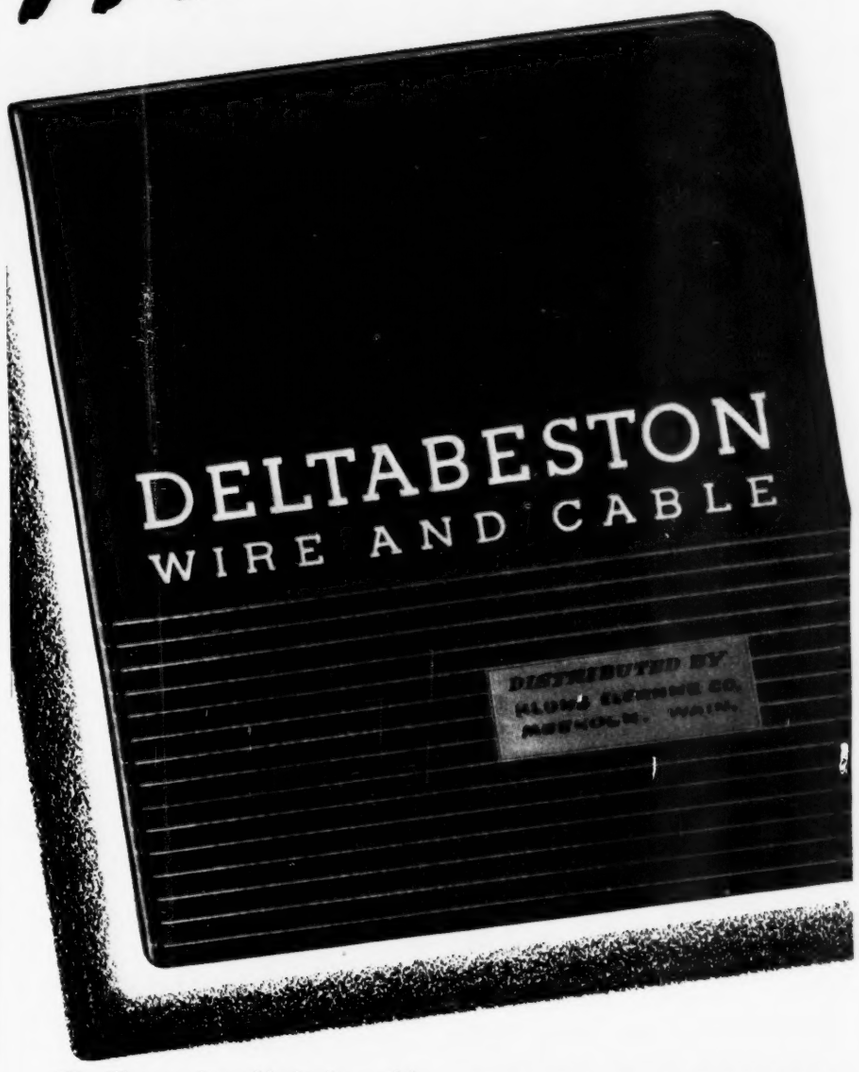

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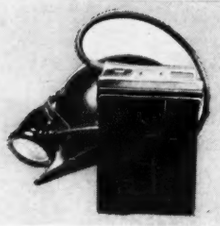
GENERAL ELECTRIC

WHEAT
THE ENGINEERED
CAP LAMP



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MORE LIGHT WITH LESS WEIGHT

Wheat has always built on the basis of maximum candle-power and minimum weight consistent with good service life. Now by the use of the Krypton gas filled bulb in combination with reflector design, it is possible again to increase effective illumination on the working surfaces without increasing weight.

Simplification of design, elimination of moving *parts*, light-weight strong plastic construction and the sponge wood separator battery have all contributed to the reduction in weight.

AND REMEMBER—Wheat has—An extra work light bulb good for 24 hours—Self service handling —A type of light that is right for every mining condition—A non-spillable battery.

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BETTER LIGHT · LESS WEIGHT
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SAVE MONEY ON MINE WELDS
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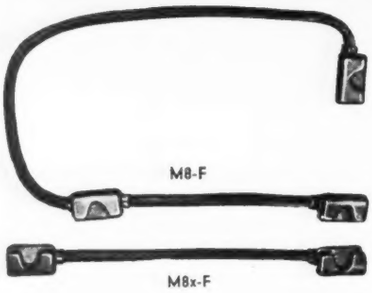
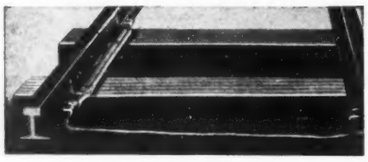


The Mosebach M8x-F Bond has only three terminals, instead of the four ordinarily used where separate joint and cross bonds are employed. Thus it saves one mine weld on each bond installed. At the same time, it gives every bond a 3 point contact, insuring better conductivity.

The Mosebach M8-F Bond has large welding area for permanent installation. For temporary work, it can be welded on ends of lugs, then removed easily with sledge and hammer, and re-used at full value many times.



M8x-F INSTALLED

All Mosebach Bonds are manufactured by the patented electric Flashweld Process, which gives them greater welded strength and lower resistance than ordinary bonds. Write for complete information.

SHIPMENTS MADE SAME DAY ORDERS RECEIVED. OUR DISTRIBUTORS IN ALL LEADING COAL CENTERS CARRY SUBSTANTIAL STOCKS.

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ELECTRIC & SUPPLY COMPANY
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the proposed minimum rates of $1.25 from the Brazil (Ind.) area, $1.32 from the Linton (Ind.) area, and $1.55 from southern Illinois were not justified.

The decision resulted from an appeal from a previous Commission order which had rejected the proposal and established minimum rates of $1.35, $1.42 and $1.65, respectively. Under previously authorized I.C.C. rates and rates proposed and rejected Feb. 19 the freight charge on bituminous coal shipped from western Kentucky to Chicago for transshipment as lake cargo was $1.90 per ton. The Commission ruled that any rates finally established by the railroads on lake cargo shipments from southern Illinois must not be more than 25c. less than the rates on similar shipments from western Kentucky. A 35c. differential had been proposed.

•

Anthracite Producers Attack Rate Structure

A sweeping attack upon freight rates has been initiated by a group of about 20 producers and shippers of Pennsylvania anthracite, it was announced on Feb. 4. The producers' group represents a majority of the industry's tonnage, and names more than 70 United States and Canadian railroads as defendants. Complaints were filed simultaneously with the Interstate Commerce Commission and the Pennsylvania Public Utility Commission.

In general, the rates attacked are: (1) those applying on buckwheat and smaller sizes of anthracite to short-haul destinations where rates on pea and larger sizes have previously been reduced, and (2) all rates to upper New York State and western Pennsylvania. The scope of the action is both intrastate and interstate in character.

Some years ago, the rail carriers published tariffs applicable to the so-called domestic sizes at levels below those theretofore in effect to meet the competition of motor trucks. These were known as "motor compelled rates." From time to time the scope of these rates was extended until they now embrace substantially all of eastern Pennsylvania, a goodly section of southeastern New York State, practically the entire states of New Jersey, Delaware, Maryland and the District of Columbia and a fringe of northeastern Virginia. They are not applied, however, to the buckwheat and smaller sizes, with the result that quite frequently the smaller and less expensive sizes take a higher freight rate than do the more expensive domestic sizes to given destinations from identical origins. This has given rise to a dislocation of what is regarded as the normal balance of the long existing rate relationships between sizes, and has occasioned, according to the complaining operators' group, severely increased truck competition.

This condition forms one phase of the sought-for adjustments—that is, corresponding reductions in junior-size rates to bring them into consonance with already granted senior-size reduced rates. The second general phase of the complaints deals with the rates on all sizes to territory in New York, Pennsylvania, and a small section of western Maryland to which no reductions in

freight rates have been effected in recent years, although anthracite freight rates have been reduced to most of the consuming area.

The two complaints were filed concurrently to bring about joint action of the two commissions in considering the matter. In filing the complaints, the operators cite the increased truck movement of coal, the encroachments of competitive fuels and the recent generally bettered financial condition of the carriers. No specified rate reductions are requested, such adjustments being left to the judgment of the respective commissions after review of the facts.

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Industrial Notes

WILLARD C. ADAMS, formerly associated with Koppers-Rheolaveur Co., has accepted the position of preparation manager of the Northern Illinois Coal Corporation, with headquarters in Chicago.

CARDOX CORPORATION, Chicago, has promoted J. H. Bell to executive vice-president (also in charge of mining activities); Eric Geertz to vice-president in charge of the fire division; Harry Ensminger to general sales manager of the fire division; Lawrence E. Lawson to vice-president of the carbon dioxide gas division, and Dr. C. A. Getz to director of research.

KOPPERS CO., Pittsburgh, Pa., has elected W. F. Munnikuysen vice-president of that company as well as general manager of the Wood Preserving Division. He formerly was president of the Wood Preserving Corporation, a Koppers subsidiary, which recently became a division of Koppers Co. H. R. Condon and E. J. McGehee, formerly vice-presidents of the Wood Preserving Corporation, have been made vice-presidents of Wood Preserving Division. D. C. Jones, Chicago; R. P. Jackson, Texarkana, Texas; and E. S. Clark, Nashua, N. H., are district vice-presidents in their respective territories. Koppers Coal Co. has moved its New York office from 90 Broad St. to 60 East 42d St. The Tar and Chemical Division and the Wood Preserving and Gas and Coke divisions also will be represented at the new address.

RELIANCE ELECTRIC & ENGINEERING CO., Cleveland, Ohio, has made Paul W. Arnold manager of machinery design applications. He has been with the company since his graduation in mechanical engineering from the University of Michigan in 1927.

ROLLER-SMITH CO., Bethlehem, Pa., has appointed John W. Clarke Co., 327 South LaSalle St., as representative for the Chicago territory. M. B. Mathley, formerly associated with the late E. E. Van Cleef, former Roller-Smith representative, will be with the Clarke company, as will C. Swain Lumley, district engineer.

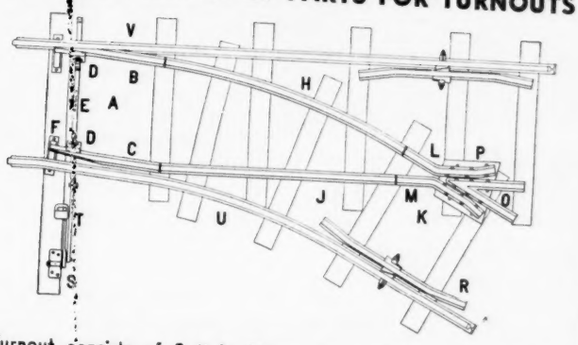
CATERPILLAR TRACTOR CO., Peoria, Ill., has appointed James H. Deaderick as assistant general parts manager. He joined the company's service department in 1929 and became assistant sales manager of the western sales division.

MOSEBACH ELECTRIC & SUPPLY CO., Pittsburgh, Pa., has appointed the Universal Supply Co., 505 Second St., Beckley, W. Va.,

WEST VIRGINIA TRACK EQUIPMENT IS GOOD . .

TRACK WORK TIPS

PREFERRED NAMES OF PARTS FOR TURNOUTS



Turnout consists of Switch, Frog, Closure Rails, Guard Rails and Switch Stand. Guard Rails are not always included.

A—Switch, including points, lugs, bar and plates
B—L. H. Switch Point
C—R. H. Switch Point
D—Switch Lugs
E—Switch Bar
F—Switch Plate
G—Heel Plate (if used)
H—Curved Closure Rail
J—Straight Closure Rail
K—Frog
L—L. H. Frog Wing Rail
M—R. H. Frog Wing Rail
O—Frog Point
P—Frog Plate
R—Guard Rail
S—Switch Stand
T—Connecting Rod
U—Curved Stock Rail
V—Straight Stock Rail

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Modern mining demands the best materials, workmanship and design in track work. West Virginia builds high grade, modern track work and their Engineers are glad to give you obligation free consultation service.

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A wire so good—so tough—that it gives long satisfactory service under most difficult conditions.

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- Armored with impregnated mica flakes

Yet, with all these superior features, IRONITE is priced to save you from 20% to 30% over copper or bronze.

Write your specifications for quantity quotations.

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Laughlin drop forged Safety Clips *grip* around wire rope like a *fist*—the rope stays straight—uncrimped—can be used again when the clips are removed.

None of the narrow "finger-pinching" you get with ordinary U-Bolt clips which bow the wire — crimp it — and eventually break it.

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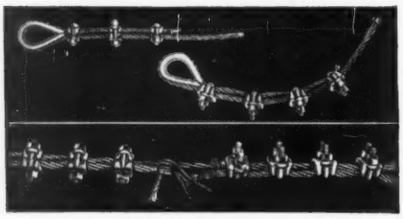

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Portland, Maine

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Look for Laughlin products in COAL MINING CATALOGS and buy through your distributor.

as distributor for that district. K. Glenn Evans is general manager of Universal.

HENDRICK MFG. CO., has opened a Baltimore sales office in the Hearst Building, Baltimore St. and Guilford Ave. B. F. Gardner will be in charge of the new branch.

JOHN A. ROEBLING'S SONS CO., Trenton, N. J., has appointed Ernest C. Low as general manager of sales. He has been identified with the company since his graduation from college in 1909. On Jan. 1, 1940, he was elected president and general manager of the John A. Roebling's Sons Co. of California.

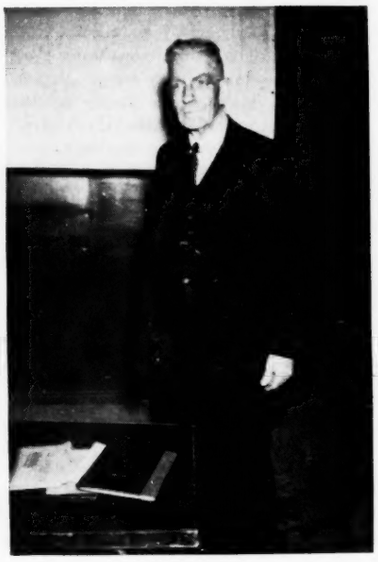
DUFF-NORTON MFG. CO., Pittsburgh, Pa., has appointed John F. Van Nort as sales manager in its western division. His headquarters will be in Chicago, with Alex S. Anderson district manager. Mr. Van Nort has been associated with a United States Steel Corporation subsidiary for 17 years.

•

Western Kentucky Institute Sees Wire-Rope Making

Exercise of extreme care in the manufacture of wire rope was stressed in an illustrated talk by Dr. A. E. Crockett, Jones & Laughlin Steel Corporation and Gilmore Wire Rope division of that company, on Jan. 28 at Madisonville, Ky., before a meeting of the Western Kentucky Mining Institute. This first meeting of the year and under a newly elected set of officers was held in the shop room of the John W. Minton Welding Co. G. M. Patterson, Lexington, chief mine inspector and head of the State Department of Mines and Minerals of Kentucky, and J. H. Edwards, associate editor of *Coal Age*, were among attendants at the meeting.

Ninety-one separate inspections and analyses, said Dr. Crockett, are involved in the making of wire rope from the mining of the ore to the finished product. The safety of a tremendous number of persons in this industry depends on quality and uniformity in wire-rope production, the speaker pointed out, and a manufacturer's cognizance of that responsibility was evident in the reels of pictures shown.



Dr. Crockett speaks prior to presenting the wire-rope movies.

•

Court Upholds Safety Shutdown

In a decision by Circuit Judge T. H. S. Curd, the West Virginia State Supreme Court of Appeals has upheld a State Mine Department shutdown order affecting one of the mines of the Page Coal & Coke Co. in McDowell County. Chief N. P. Rhinehart ordered the Pageton mine closed after the company is alleged to have refused to rock-dust and hire firebosses as precautions against explosions. The company contended

State inspectors and institute officers at Madisonville meeting

Left to right: G. M. Patterson, chief; James Fugate, local district inspector; W. O. Smith, Luzerne-Graham Mining Co., president; Ward Padgett, Crescent Coal Co., first vice-president; C. E. Myers, Dawson Daylight Coal Co., second vice-president; Thomas Long, consulting civil and mining engineer, secretary-treasurer, and Earl T. Smith, explosives department DuPont company, chairman, program committee. Harry Solman, Carbon Valley Coal Co., third vice-president, was absent.

that the mine is not gaseous and the precautions, therefore, are unnecessary. It is likely that the company will appeal from the court's ruling.

•

Birmingham Tries Experiments To Eliminate Smoke

Various methods of burning bituminous coal without smoke are being used in Birmingham, Ala., as a result of a city-wide smoke-abatement campaign under way there. Although a no-smoke ordinance has been adopted, Commissioner of Public Improvements James A. Morgan said educational and publicity methods only were being used during the first year of the campaign to improve atmospheric conditions. He said there was no intention of forcing soft-coal users to change over to other fuel, since Birmingham is the center of a coal-mining industry, and he insisted that 75 per cent of the smoke could be eliminated by installing proper firing equipment.

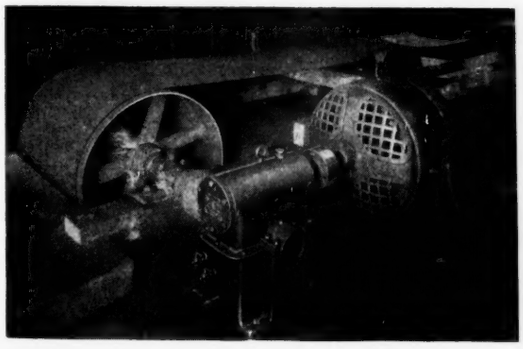
Coal producers and sellers are actively cooperating in the campaign. More and more coal dealers are selling stokers as perhaps offering the best solution. Also two or three dealers are selling compounds for treating coal and at least one concern, the Lenz Oil & Coal Co., is installing a plant for the chemical treatment of coal.

In a number of the larger heating plants it is being found that provision for more overfire draft eliminates the smoke problem. The Birmingham Electric Co., which operates a big downtown plant to supply steam to the city, installed blowers for its battery of six 600-hp. boilers which operate on the chain-grate principle. These blowers force air through jets into the firebox above the fuel bed, mixing air and gas strata in such a way as to cause complete combustion and eliminate high stack losses and smoke.

In some of the smaller heating plants, notably among laundries and dry cleaners, overfire steam jets have been installed. When fresh fuel is added, steam is sprayed over the firebed and this creates a suction, drawing in additional air, which causes more rapid and complete combustion.

The Birmingham Housing Authority, at its $3,000,000 Elyton Village housing project, was so well pleased with the use of treated coal that it ordered its contractor to supply this kind exclusively in the future. In this test 4,210 lb. of untreated coal was consumed over a period of 24 hours, which evaporated 36,437 lb. of water at 183 deg. F. with an ash and clinker residue of 283 lb. Then a like quantity of treated coal was consumed over a period of 24 hours, which evaporated 40,250 lb. of water at 183 deg. F. with a residue of ash and clinkers of 156 lb.

"An analysis of these two results," said Daniel W. Bateman, technical adviser for the Housing Authority, "will show that 10.4 per cent more water was evaporated by the use of the treated coal, which, of course, would give that much more steam—in other words, would reduce the fuel required by 10.4 per cent. We know that the use of this chemically treated coal will practically eliminate the smoke nuisance which you



•

1,510,000 tons of wet coal have been passed over this belt conveyor in the plant of the Potter Coal & Coke Co. during some **eleven years,** but the 25 to 1 ratio **De Laval worm gear** through which the belt is driven has given no trouble and has required no repairs.

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For heads up to 250 feet and capacities up to 100 g.p.m.

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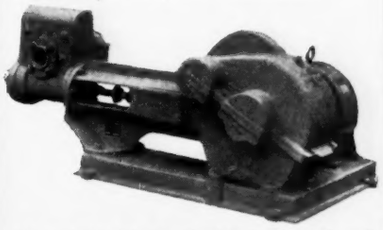

(Above) Model PA—Furnished with 5x6 and 6x6 cylinders. Shafts are carried on split bronze bearings.

(Below) MODEL PB—Furnished with 4x5 and 5x5 cylinders. Shafts carried on ball bearings. Mounted on skids—No sub-base required.

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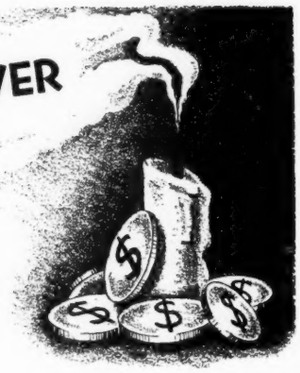

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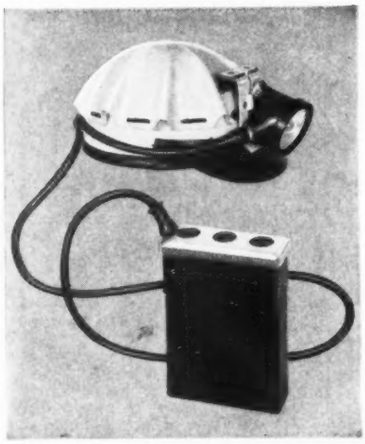
With PORTABLE'S CAP LAMPS



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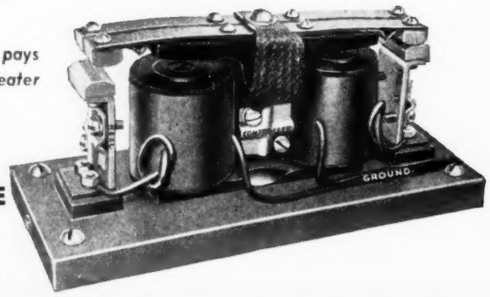

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would normally get from a heating plant of this size."

Home owners are being encouraged to install stokers or at least to improve their hand-firing methods so as to eliminate smoke. The city smoke inspector, T. W. Langford, has held several schools for firemen and visited thousands of homes in the course of his work.

•

Captive Miners to Receive Unemployment Relief?

In a decision handed down by the Alabama Court of Appeals it has been held that captive mine workers of the Tennessee Coal, Iron & Railroad Co. are entitled to unemployment compensation because they were not engaged in a labor dispute during the period they were idle in 1939 when a new wage contract was being negotiated by the company with the United Mine Workers (C.I.O.).

In writing the majority opinion, in which Justice Rice concurred, Justice Simpson said Drummond, an employee of the company's No. 8 Wylam mine, was in no way interested or concerned in the wage negotiations either personally or by organization affiliation. He held that the Brotherhood of Captive Mine Workers (A.F.L.) held a contract and was not in disagreement with the company. Justice Simpson quoted a company executive as testifying that the mines were closed through fear of violence. "This 'fear of violence' was the direct cause of appellee's unemployment," said the court, "and not the 'labor dispute' in which the C.I.O. affiliates were involved."

On the other hand, a decision in the same court previously held that the United Mine Workers were out of work at the same time directly because of a "labor dispute" and were not entitled, therefore, to unemployment compensation. The latter ruling was sustained recently by the Alabama Supreme Court.

•

Koppers Leases Coal Lands

Negotiations have just been consummated by the Koppers Coal Co. for a 25-year lease, with the privilege of renewal for an additional 25 years, of 4,393 acres of coal land in Marion and Monongalia counties, West Virginia. The land has been leased on a royalty basis from the Little Kanawha Syndicate, owned jointly by the Pittsburgh & Lake Erie, Pennsylvania and the Baltimore & Ohio railroads.

•

Byproduct Ovens for Weirton

A contract has been awarded by the Weirton Steel Co. to the Koppers Co. for construction of a battery of byproduct coke ovens at the steel company's Weirton (W. Va.) plant. The new battery will comprise 45 ovens, representing a considerable expansion in the steel company's carbonizing facilities. Capacity will be increased to about 400,000 tons a year. In connection with the execution of this contract there also will be changes in the coal and coke handling system at the plant.

Coal-Mine Accident Fatality Rate Shows Downward Tendency

Accidents at coal mines of the United States caused the deaths of 72 bituminous and 15 anthracite miners in December last, according to reports furnished the U. S. Bureau of Mines by State mine inspectors. With a production of 40,600,000 net tons, the accident death rate among bituminous miners was 1.77 per million tons, compared with 2.02 in December, 1939.

The anthracite fatality rate in December last was 3.21, based on an output of 4,671,000 tons, against 4.14 in the corresponding month the year before.

For the two industries combined, the accident fatality rate in December last was 1.92, compared with 2.22 in the last month of the preceding year.

Fatalities during December last, by causes and States, as well as comparable rates for the twelve months of 1939 and 1940, are shown below.

•

Technologists Required By the Government

The U. S. Civil Service Commission has announced open competitive examinations to obtain technologists for national defense work. Difficulty is being experienced in filling positions in such branches of technologists as fuels, explosives, plastics, rub-

UNITED STATES COAL-MINE FATALITIES IN DECEMBER, 1940, BY CAUSES AND STATES

State	Underground									Open-cut and Surface			
	Falls of Roof	Falls of Face	Haulage	Gas or Dust Explosions	Explosives	Electricity	Machinery	Other Causes	Total Underground	Shaft	Falls of Persons	Other Causes	Total Surface	Grand Total
Alabama	2	..	..	..	1	..	..	..	3	..	..	..	..	3
Arkansas	1	..	2	..	..	..	..	..	3	..	..	..	..	3
Colorado	1	..	1	..	..	..	..	..	2	..	..	1	1	3
Illinois	5	..	1	..	..	1	..	..	7	..	..	1	1	8
Indiana	1	..	2	..	..	..	1	..	4	..	..	..	..	4
Kentucky	3	..	3	..	..	..	1	..	7	1	..	..	..	8
Missouri	1	..	..	..	..	..	..	..	1	..	..	..	..	1
Montana	1	..	..	..	..	..	..	..	1	..	..	..	..	1
Ohio	3	..	..	..	..	..	..	..	3	..	..	..	..	3
Pennsylvania (bit.)	4	..	3	..	..	..	..	..	7	..	..	..	..	7
Tennessee	1	1	1	1	..	..	..	..	4	..	..	..	..	4
Virginia	2	..	..	..	..	..	..	..	2	..	..	..	..	2
West Virginia	12	1	2	9	..	..	..	..	24	..	..	1	1	25
Total (bituminous)	37	2	15	10	1	1	2	..	68	1	..	3	3	72
Pennsylvania (anthracite)	9	3	..	..	1	..	..	1	14	..	1	..	1	15
Grand total	46	5	15	10	2	1	2	1	82	1	1	3	4	87

FATALITIES AND DEATH RATES AT UNITED STATES COAL MINES, BY CAUSES*

January-December, 1939 and 1940

Cause	Bituminous				Anthracite				Total			
	Number Killed		Killed per Million Tons		Number Killed		Killed per Million Tons		Number Killed		Killed per Million Tons	
	1939	1940	1939	1940	1939	1940	1939	1940	1939	1940	1939	1940
Underground:												
Falls of roof and coal	500	512	1.283	1.130	121	102	2.357	2.039	621	614	1.408	1.220
Haulage	155	186	.398	.411	27	35	.526	.699	182	221	.413	.439
Gas or dust explosions:												
Local	15	13	.038	.029	3	5	.058	.100	18	18	.041	.035
Major	28	276	.072	.609	...	...	.....	.....	28	276	.063	.548
Explosives	15	26	.038	.057	17	9	.331	.180	32	35	.073	.070
Electricity	49	31	.126	.068	2	6	.039	.120	51	37	.116	.074
Machinery	37	25	.095	.055	1	3	.019	.060	38	28	.086	.056
Shaft	5	10	.013	.022	6	3	.117	.060	11	13	.024	.025
Miscellaneous	19	25	.049	.055	14	7	.273	.140	33	32	.075	.064
Stripping or open-cut	9	12	.023	.026	7	5	.136	.100	16	17	.036	.034
Surface	35	40	.090	.088	13	6	.253	.120	48	46	.109	.091
Grand total	867	1,156	2.225	2.550	211	181	4.109	3.618	1,078	1,337	2.444	2.656

* All figures subject to revision.

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ber, minerals, and textiles. Persons qualified in these branches are particularly urged to file applications.

The positions to be filled are in several grades with salaries ranging from $2,000 to $5,600 a year. For the grades other than junior technologist competitors will not have to take a written test but will be rated upon their education and experience.

The duties of the higher grade positions include the planning, conducting and reporting of investigation or research in a specialized branch of technology; or the testing, designing or manufacturing of the materials essential for the successful operation of an industrial plant. All applicants must have completed a four-year college course with specialized major study, and for all but the junior grade appropriate experience in the field of technology also must be shown.

Applicants for other than junior technologist will be rated as received until Dec. 31, 1941. Further information and application forms may be obtained from the secretary of the Board of U. S. Civil Service Examiners at any first- or second-class post office or from the U. S. Civil Service Commission, Washington, D. C.

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Buckhannon Ovens Refired

Of the 36 old coke ovens at the plant of the Buckhannon River Coal Co., Adrian, W. Va., 20 have been placed in operation and the remaining ovens are to be refired soon. Twenty additional men are to be employed when all the ovens are in operation. Charles E. Poole, of Clarksburg, will have charge of the ovens.

•

Fellowships at Alabama

Fellowships in mining and metallurgical research are offered by the School of Mines of the College of Engineering of the University of Alabama in cooperation with the U. S. Bureau of Mines. The fellowships are open to graduates of universities and engineering schools having proper qualifications to undertake research investigations. Each fellowship is valued at $500 per year of nine months beginning Sept. 1 and may be extended for a second year. The fellowships have been established for the purpose of undertaking the solution of mining and metallurgical problems of special importance to the State of Alabama and the Southern States. Applications should be addressed, not later than April 15, to J. R. Cudworth, director, School of Mines, University of Alabama, University, Ala.

•

Utah Occupation Disease Study Brings Suggested Controls

Deep interest has been elicited by the report presented following a two-year study of occupational disease hazards recently completed in the Utah mining industry. Whatever may be the immediate effect of the survey and report, local coal officials regard it as another step in the direction of increased State regulation of mining enterprises.

The study, conducted jointly by the Utah State Board of Health and the U. S. Public Health Service, branded dust-control methods in Utah mines and smelters as inadequate and recommended the establishment of "tentative maximal permissible limits" of dust concentration for the respective mining activities. A threshold of 20 million particles of dust per cubic foot of air was recommended for coal mines.

Other controls recommended in the report included perpetuation of the new industrial hygiene unit of the State Board of Health, which made the study, and broad environmental, engineering and medical controls. An occupational disease compensation bill has been introduced in the 1941 session of the Utah Legislature on the basis of the report.

A total of 507 workers in three representative coal mines—roughly one-fifth of

Strippers Show Geology How to Speed Up

Using a LeTourneau Bulldozer and Carryall in conjunction with a dragline, a corn field one mile south of Magnolia, Ohio, was quickly transformed into a productive coal field. The dragline cast material on either side of the box cut. These spoil banks were then shoved away from the edge of the cut by the 'Dozer to make room for additional cast material. Later the Carryall scraper was used to strip down to coal, a distance of about 30 ft.

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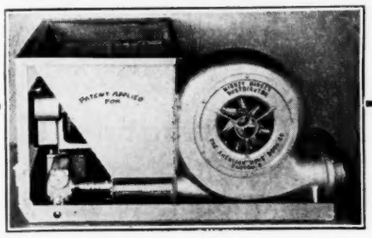
DUST EXPLOSION



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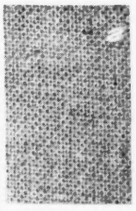

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the coal miners in the State—were given intensive medical examinations in the survey. Engineering and sanitary studies of mines, buildings and miners' communities also were conducted as part of the survey. Similar studies were made of representative non-ferrous mines and smelters.

"As a group, these bituminous coal miners enjoyed good health," it was stated in a summary of the medical study. Only 16 persons (3.2 per cent) were found to be infected with anthraco-silicosis, a modified form of silicosis, due to silica admixed with large quantities of carbon dust. And that was the principal occupational disease discovered.

"Other occupational hazards did not appear to be of significance," the summary continued. "Pulmonary tuberculosis, syphilis and heart disease were found in about the same proportion as in other industrial surveys. Miners' nystagmus, bursitis and related conditions were not observed. No evidence of lead or other metallic intoxication was found."

One Reached Second Stage

Fifteen of the 16 workers with anthraco-silicosis showed evidence of first stage of the disease, with but little disability, and the other one was in the second stage, with moderate disability. The report suggested that exposure resulted from rock work, the handling of coal containing bony, rock-dusting, and from the dispersion of fine sand in the haulageways. The disease was found only in workers whose principal occupation was in the mines, no cases being found among men working at the face and three cases among transportation workers.

Incidence of the disease increased with heavier dust concentrations and length of employment. Anthraco-silicosis was not found among workers with less than ten years of employment in coal mines, and was found in only two instances among workers with an average weighted dust concentration of less than 20 million particles per cubic foot of air. Ten of the 16 diseased men had spent half their working years in coal mines outside of Utah.

Engineering studies of the environment showed that only 24 per cent of the workers are exposed to more than 30 million dust particles per cubic foot of air. The majority (59 per cent) are exposed to concentrations ranging from 5 to 29 million particles and 17 per cent are exposed to concentrations under five million.

The following measures were recommended to curb dust in coal mines: (1) Adequate ventilation of all work places, with an air velocity of at least 50 ft. per minute. (2) Wetting, instead of sanding, in the haulageways. (3) Inclosure of sand screens and use of an exhaust fan to carry away dust generated in screening. (4) Increased air for working low seams to remove dust quickly. (5) Wetting of coal before loading in the mine or, preferably, installation of a wet-washing machine or local exhaust ventilation.

General recommendations were made for engineering control of mines and smelters. They included: Wet methods in almost all mining and processing operations in order to control dust at point of origin; adoption of recommendations of the American

Low Cost OSMOSE TREATED TIMBER

CONTINUES TO CUT DOWN THE HIGH COST OF REPLACEMENTS

for prominent companies throughout the mining fields of the entire United States.

Above—*The Hatfield Campbell Creek Coal Co. uses Osmose Treated Ties and Timbers in both Kentucky and West Virginia mines.*

•

Every week still more mining companies are beginning to use the Osmose Process as a means of making mine ties and timbers last three to five times longer! Many of these companies carefully checked the reports of users who have had years of experience with Osmose treated Timber. These reports showed that the Osmose Wood Preserving Process is:

EFFECTIVE—Osmose Treated Timber lasts at least three to five times longer.

ECONOMICAL—Treatment costs only $10 to $12 per MBF.

CLEAN, odorless and fire retardant.

APPLICABLE to fresh cut native woods locally obtained without necessity for investment in treating plant.

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THE OSMOSE PROCESS BRINGS THE SCIENCE OF WOOD PRESERVATION TO YOUR OWN BACK DOOR.

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Standards Association on sanitation; periodic inspection of control methods, and proper sewage disposal and sterilization of water-supply sources in communities adjacent to mines.

Recommendations from the medical studies applied primarily to the non-ferrous metal-mining industry, but some of the 13 recommendations had general application, including preemployment physical examinations and annual medical examinations, and expanded medical service generally.

•

Trade Literature

ADJUSTABLE-SPEED DRIVE—Reliance Electric & Engineering Co., Cleveland, Ohio. Bulletin 310 cites advantages of its all-electric adjustable-speed drive for a.c. circuits, illustrations showing it in use in a variety of applications.

BARREL LIFT—Falstrom Co., Passaic, N. J. Bulletin 104 describes and pictures unit that lifts, moves, tilts and turns barrels, drums and containers easily, quickly and safely.

CAR TRANSFER—American Mine Door Co., Canton, Ohio. Bulletin relates how "Canton" unit makes for continuous loading, saving time, labor and trackage besides cutting cost of loading.

CIRCUIT BREAKERS — Roller-Smith Co., Bethlehem, Pa. Catalogs 3650 and 3940 illustrate and describe Class 250-OS-150 and 250-OS-230 and Type MS-2 oil circuit breakers.

CONVEYORS—Ajax Flexible Coupling Co., Westfield, N. Y. Bulletin 31 covers the applications of self-contained vibrating-type bulk-material conveyors for overhead, floor and sub-floor installations in a wide range of industries.

DIESELS—Cummins Engine Co., Columbus, Ind. Bulletins 5179 and 5182 contain pertinent information designed for those interested in cheap and dependable power. Flexibility and versatility are emphasized by the manufacturer as characteristics of these engines.

DIRECT-FIRED SYSTEMS—Combustion Engineering Co., New York City. Catalog PC-6 incorporates the latest improvements in mills and burners as well as many of the latest installation drawings of steam-generating units covering a wide range of capacity and pressure.

DISTRIBUTION TRANSFORMER — Allis-Chalmers Mfg. Co., Milwaukee, Wis. Bulletin B-6125 covers distribution transformers in sizes ranging from 37½ to 200 kva. designed for standard voltages of 2,400 to 69,000. Also included are design and construction features, with dimension sheets.

DRYER—Link-Belt Co., Chicago. Catalog 1911 describes the Roto-Louvre dryer—also used as a cooler—which is recommended for drying of coal and many other products. Halftones and drawings show typical installations.

DRYER—Western Precipitation Corporation, Los Angeles, Calif. Bulletin D-1 features the new Turbulaire dispersion

COFFING RATCHET LEVER HOISTS | **ADVANCED DESIGN** SPUR GEAR HOISTS | **HOISTS** ELECTRIC HOISTS

RATCHET LEVER HOISTS

can save time and money on these jobs . . .

- pulling overhead trolley cables
- maintenance of dump cars
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- skidding and installing heavy machinery
- changing screens
- changing cables on cages
- electric shovel maintenance
- raising and lowering equipment to and from deck
- changing spiders
- repairing truck frames
- straightening shafts
- lifting batteries to shuttle cars

The original ratchet lever hoist with the unusual safety feature of dual ratchet and pawl assembly with load always under control. Standard equipment at many large mines for all types of maintenance work. Operates in any position—cap. from ¾ ton—14 lbs. to 15 ton—150 lbs. Sold thru Mill Supply Houses all over the country. Send for catalog CG-4.

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TIME TO PREPARE

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PREMIUM Stoker Coal

Erecting a "Pennsylvania" BRADMILL for preparing PREMIUM Stoker coal.

Tests made in 3 different types, leading to selection of equipment for preparing 1¼"x⅛" Domestic Stoker coal, indicated approx. 22%, and 16% minus ⅛" from two types, with varying amounts of oversize, while the BRADMILL test showed less than 9% ⅛" and *no* oversize.

With more than $1.00 differential between Stoker coal, and the ⅛" fines, savings show early amortization of the investment made in the BRADMILL.

On receipt of your Stoker Coal specifications, we will be glad to make recommendations and quotation on indicated equipment.

Ask for Bulletin 8001

PENNSYLVANIA CRUSHER COMPANY

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dryer, outlining in detail the advantages of dispersion drying and applications of the method.

EARTH MOVERS—Caterpillar Tractor Co., Peoria, Ill. Catalog Form 6425 lists the more than 50 products manufactured by the company. Sections are devoted to track-type tractors, road machinery, diesel and natural-gas engines, diesel marine engines, diesel automotive engines, and diesel and natural-gas electric sets. Each of the products is illustrated, and brief specifications are given.

EARTH MOVERS—R. G. LeTourneau, Inc., Peoria, Ill. Catalog Form A-11 pictures and describes the company's entire line of Carryall scrapers, Bulldozers, Angledozers, Rooters, sheep's foot rollers, tractor cranes, power-control units, Tournapulls, Tournatrailers and Tournacar welders. Complete specifications of each unit are given together with its application; working features of the different machines are diagramed, pictured and described. Folder Form A-14 points out money-saving applications of 'Dozers, Rooters and Carryalls.

ELECTRIC TOOLS—Independent Pneumatic Tool Co., Chicago. Catalog 61 shows 19 new models of Thor high-frequency electric tools, contains a complete section of balancers, and is illustrated with tool and action pictures.

FANS—Wagner Electric Corporation, St. Louis, Mo. Bulletin FU-41 illustrates and describes the complete line of Wagner cooling and ventilating equipment, including installation and application data.

HOISTS AND ELEVATORS—American Hoist & Derrick Co., St. Paul, Minn., has issued the following catalogs: 100-H-1A, General-Purpose Hoists; 100-H-4A, Steam Hoisting Engines; 200-D5, Portable Material Elevator; 300-BS-1, Wire Rope Blocks and Sheaves; 400-R-1A, American Revolvers.

PRESSURE TREATMENT OF WOOD—Koppers Co., Pittsburgh, Pa. Bulletin Form TD-5 discusses the use of creosote for the pressure treatment of wood to protect it against termites, marine borers, mold and fungi. Form TD-6 describes the use of creosote-coal tar solutions by the same methods for similar purpose.

PUMPS—Worthington Pump & Machinery Corporation, Harrison, N. J. Bulletin W-325-B1 cites features and advantages of Type JZ single-stage condensate pumps.

WATER CONDITIONING—Cochrane Corporation, Philadelphia, Pa. Catalog 3000 treats of hot-process water softeners for removal of hardness, silica and other scale-forming material from boiler feed and industrial process waters. It aims to provide a basis for selecting the proper method of feed water conditioning that will be most suitable and economical for any given plant.

WELDING POSITIONERS — Cullen-Friestedt Co., Chicago. Bulletin WP-20 is a study of the factors involved in the handling of weldments of all sizes and shapes, with illustrations showing the use of positioners in modern industrial use. It describes the complete line of C-F positioners with specifications.

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Frequent and severe accidents always lead to higher insurance costs, and disrupt vital schedules of production.

Only a well planned safety program can reduce your accident frequency and KEEP IT DOWN!

Bituminous Casualty mine safety engineers are qualified and ready to aid you. Every policy assures this FREE service and complete protection under the workmen's compensation law of your state.

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B&C SECURITY THROUGH SERVICE

SUPER LUMPS *Hold No Terrors* FOR U.S. RUBBER BELTS

Here, in one of the largest mines in the country, a 30-inch U. S. MATCHLESS Mother Belt is being ruthlessly bombarded by two 18-inch U. S. MATCHLESS anti-drag room belts. Then, under low ceilings, over uneven floors, the coal moves steadily, speedily and efficiently on its 2000-foot trek to the cars.

And it's because U. S. Conveyor Belts are able to take such thorough-going beatings... because, day after day, they absorb this terrific kind of punishment and return doggedly for more... *because they are so constructed that they cannot be affected by mildew* — that more and more U. S. Conveyor Belts are being specified by mine operators and builders of belt conveyor systems.

We are always glad to furnish details of such installations, and to work with you and your engineers on your conveyor problems.

SERVICE BEYOND PRICE AND SPECIFICATIONS

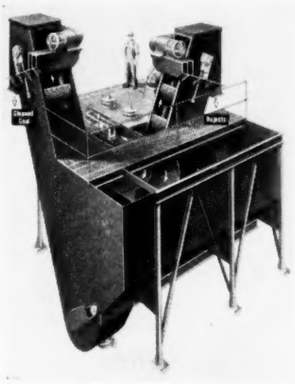
United States Rubber Company

1230 Sixth Avenue, Rockefeller Center, New York, N. Y.

WHAT'S NEW IN COAL-MINING EQUIPMENT

UNIT COAL WASHER

A new McNally-Norton unit coal washery which includes a raw-coal wash box, settling tank, pump sump and recirculating pump, controls, and electric motors is offered by McNally-Pittsburg Mfg. Corporation, Chicago, to the small-tonnage mine as a single self-contained unit. Its capacity range is 25 to 75 t.p.h. in nut, egg, stove and stoker sizes. Clean coal is returned to the same point at which raw coal enters, simplifying installation.



Components of the box include a McNally-Norton 2- or 3-cell compartment wash box with air compressor, valves, rejects elevator, automatic refuse controls, and selective gravity control. There is a newly designed settling tank, and washed-coal launder, with spiral sludge conveyor. Launders discharge to dewatering washed-coal elevator. The recirculating system includes a centrifugal pump, valves, and automatic water-pressure relief valve. Complete washery controls and necessary electric motors are integral parts of the new unit.

•

NON-MAGNETIC STEEL

Manganal — an austenitic, tough, non-magnetic steel containing 11 to 13½ per cent manganese and 3½ per cent nickel—is offered by Joseph T. Ryerson & Son, Inc., Chicago. With this product considerable weight can be saved in building composite structures by welding castings and manganal plates, using manganal only where necessary for wear resistance. The 3½ per cent nickel content permits manganal plates to be welded without subsequent quenching treatment, as there is no loss in toughness when manganal is cooled from the welding temperature.

Welding rod of 18-8 stainless composition, it is said, has been found to give satisfactory results when used with manganal. The latter can be flame-cut, requires no subsequent heat-treatment when formed or punched hot, and thicknesses up to ½ in. can be sheared. Strong and durable, it is said that, under proper application, it will resist impact and abrasion many times longer than ordinary carbon steel.

•

EXCAVATOR

Lima Locomotive Works, Lima, Ohio, offers a ¾-yd. combination shovel, dragline, crane and pull shovel known as the Super-Paymaster as a major contribution to the earth-moving and material-handling industry. Embodying features that made its predecessor, the Paymaster, popular, its capacity when equipped as a

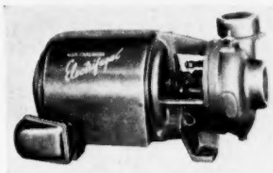
clamshell or dragline depends upon length of boom and material to be handled. When equipped as a crane it has 13 tons capacity. As a shovel it is equipped with an 18-ft. boom and 15-ft. dipper handle.

It is said to be exceptionally fast, with ample strength to give steady, dependable service in all kinds of work. Anti-friction bearings are used at all important bearing points, including drums.

•

CENTRIFUGAL PUMP, VIBRATING SCREEN

Allis-Chalmers Mfg. Co., Milwaukee, Wis., announces its new "Electrifugal" pump, which is an all-in-one centrifugal unit especially designed as a complete pump and motor unit on one shaft and one housing. Instead of using standard motors having special

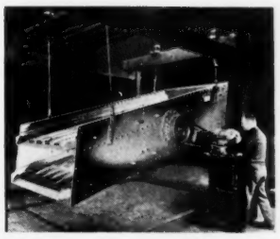


end housings and shaft extensions, the "Electrifugal" pumping unit has a special motor with a one-piece cast-iron motor yoke and pump bracket. The feet are cast integral with the housing and bracket and extend under the entire unit instead of under the motor only.

The special motor design, with copper-bearing steel cover, meets N.E.M.A. specifications for splashproof motors. Totally inclosed fan-cooled motors and explosion-proof motors also are available in the "Electrifugal" type. In splashproof construction the "Electrifugal" pump is now available in sizes from 1 to 10 hp. inclusive at 3,500 r.p.m., and from ¾ to 7½ hp. inclusive at 1,750 r.p.m. for heads up to 160 ft. Larger sizes of this type are in process of design.

For normal service the pump is built with cast-iron casing, bronze fitted. It can, however, be made all iron, all bronze, all stainless steel or of other special metals to suit any industry.

A new vibrating screen called the "Ripl-Flo" has been developed by A.-C. Having an eccentric shaft working with the unbalanced force of the counterweighted flywheels, the new



mechanism vibrates the entire screen body in rapid circular gyratory motion. It is said to be especially suitable for screening coal and coke.

The screen consists of two high-tensile-steel side plates spaced apart by welded-steel deck supports, with the operating mechanism inclosed in a tubular housing between the decks. The shaft is eccentric between bearings and provides much of the force which causes the screen body to gyrate. Fine adjustments for balance are made in the flywheels externally.

The two bearings are large and of the anti-friction type. One of the flywheels combines the Texrope-drive sheave through which power from an electric motor is applied. The flywheels themselves do not gyrate, as the shaft is so turned that their center of rotation coincides with the center of gyration of the screen body.

This screen will be built in single- and double-deck types in sizes up to and including 6x14 ft. The single-deck screen is so designed as to permit easy changeover to a double-deck screen in the field, should the occasion arise.

•

WINTER HAT LINING, GAGE TESTER

Mine Safety Appliances Co., Pittsburgh, Pa., announces a new type of winter lining for Skullgards which is so designed and attached to the Skullgard that every part of the head, neck and ears is covered to provide complete protection against cold and snow. The lining consists of two parts: (1) a skullcap laced into the Skullgard shell integral with the sweatband, and (2) earlugs that zip into this skull-

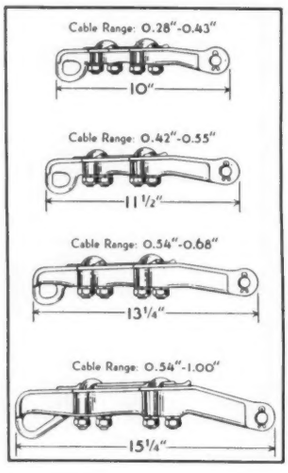
cap. Both parts are made of water-repellent Grayfall cloth having a lining of warm woolen material. This lining can be readily assembled into a Skullgard in the field and will not affect the original sweatband size. It is furnished in two sizes for large and small Skullgard shells.

A velocity power gage tester is offered by M.S.A. designed for safely testing gages used in conjunction with compressed gas storage cylinders, to determine their ability to withstand sudden applications of surge pressure encountered under service conditions. Energy created by the discharge of a blank cartridge is utilized as a source of pressure. A transparent guard, covering the gage to be tested, permits visual observation at all times. Pressures resulting from the cartridge discharge are transmitted directly to the gage, causing it to function in a normal manner under high initial loads. A signal light indicates that the gage has been subjected to the required test pressure.

•

DEAD-END CLAMP

Expandlng its line of special clamps for dead-ending bus conductors in stations or line conductors at towers, Ohio Brass Co., Mansfield, Ohio, has added a fourth and larger size for 0.54-1.00-in. cables. Known as Stratelines, these clamps allow a cable to pass through the dead-ending device in a straight line.

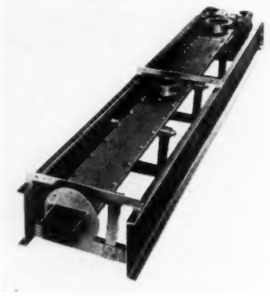


This design, says the manufacturer, prevents twisting of wire and clamp, and clearances are greater than those afforded by usual dead-end clamps. Intermediate fittings are not necessary with cable buses because the clamp can be connected directly to a clevis-type suspension insulator. Socket and clevis fittings can be furnished, however, to provide adequate clearance when used for dead-ending conductors on transmission structures. A stringing loop at one end of the clamp simplifies installation and makes hot-line changes easier and safer, it is said. Clamp surfaces are free from sharp points which might induce flashover or radio interference. The clamp is made of malleable iron, hot-dip galvanized.

•

VIBRATING CONVEYOR

An improved conveyor of the vibrating type featuring totally inclosed design, minimum headroom, and rubber-shackled pan mounting with self-contained patented reciprocating drive is announced by Ajax Flexible Coupling Co., Westfield, N. Y.



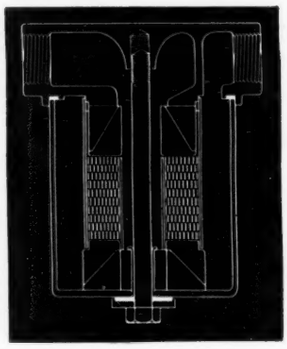
The conveyor is equipped with two intakes and a single discharge. Flanges are provided for flexible boots on intake and discharge openings for convenient dustproof connection to hoppers and chutes. These low-headroom conveyors are available in standard and special lengths up to 50 ft. or more and widths up to 4 ft. For long distances, they can easily be installed in series.

The driving mechanism is self-balancing and applies the reciprocating motion directly to the conveyor pan; therefore transmission of vibration to surrounding structures is entirely eliminated. Due to the smooth action of the drive unit and efficient application of its kinetic force, says the manufacturer, horsepower requirements are very small; likewise, maintenance cost is low. The newly developed Ajax rubber-bushed shackles connect the supporting springs to the pan, resulting in smooth and uniform action and making possible high conveying speeds. Shackles require no lubrication.

•

MAGNET OIL FILTER

S. G. Frantz Co., Inc., New York City, offers the FerroFilter, a permanent magnet device which, it is said, magnetically extracts coarse and small iron particles (even as microscopically fine as 1-25,000 in. in diameter) from suspension in lubricating-oil circulating systems at no operating or maintenance cost.



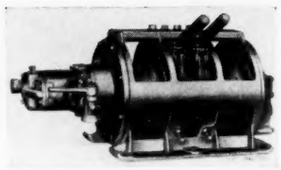
It consists essentially of a stack of magnetized screens inclosed in a cylindrical casing through which the oil flows. These screens have triangular mesh openings of about $\frac{1}{8}$ in. Although offering little resistance to the flow, their design presents hundreds of feet of strongly magnetized edges to the oil. These edges comb and recomb the oil, giving, it is said, an extremely high efficiency of removal. The magnetic particles are held firmly to the screen edges until the FerroFilter is cleaned.

•

SCRAPER HOIST, COMPRESSOR

Ingersoll-Rand Co., Phillipsburg, N. J., offers a new light compact double-drum scraper hoist weighing only 250 lb. (without cable guides). It was designed especially for small scraping jobs in thin, narrow veins or stopes, irregular veins, crosscuts, for spreading wastes, for development work, etc. It has a cable pull of 650 to 1,000 lb. and a cable speed of 125 to 150 ft. per minute.

Either air or electric drive is available. The air motor is an Ingersoll-Rand "Multi-Vane" type with a governor which limits the free speed and conserves



air. Construction details include: an individual clutch lever control for each drum; no tools are required to make a clutch adjustment, which is external and easily made by hand; all gears are totally inclosed and operate in a grease bath; antifriction bearings support all rotating parts; helical stub-tooth gears provide smooth, quiet operation.

I-R also has introduced a new two-stage air-cooled compressor that delivers 60 cu.ft. of free air per minute at a discharge pressure of 100 lb. Known as the D-60, it is said by the company to be inexpensive, thoroughly reliable, extremely compact and light in weight.

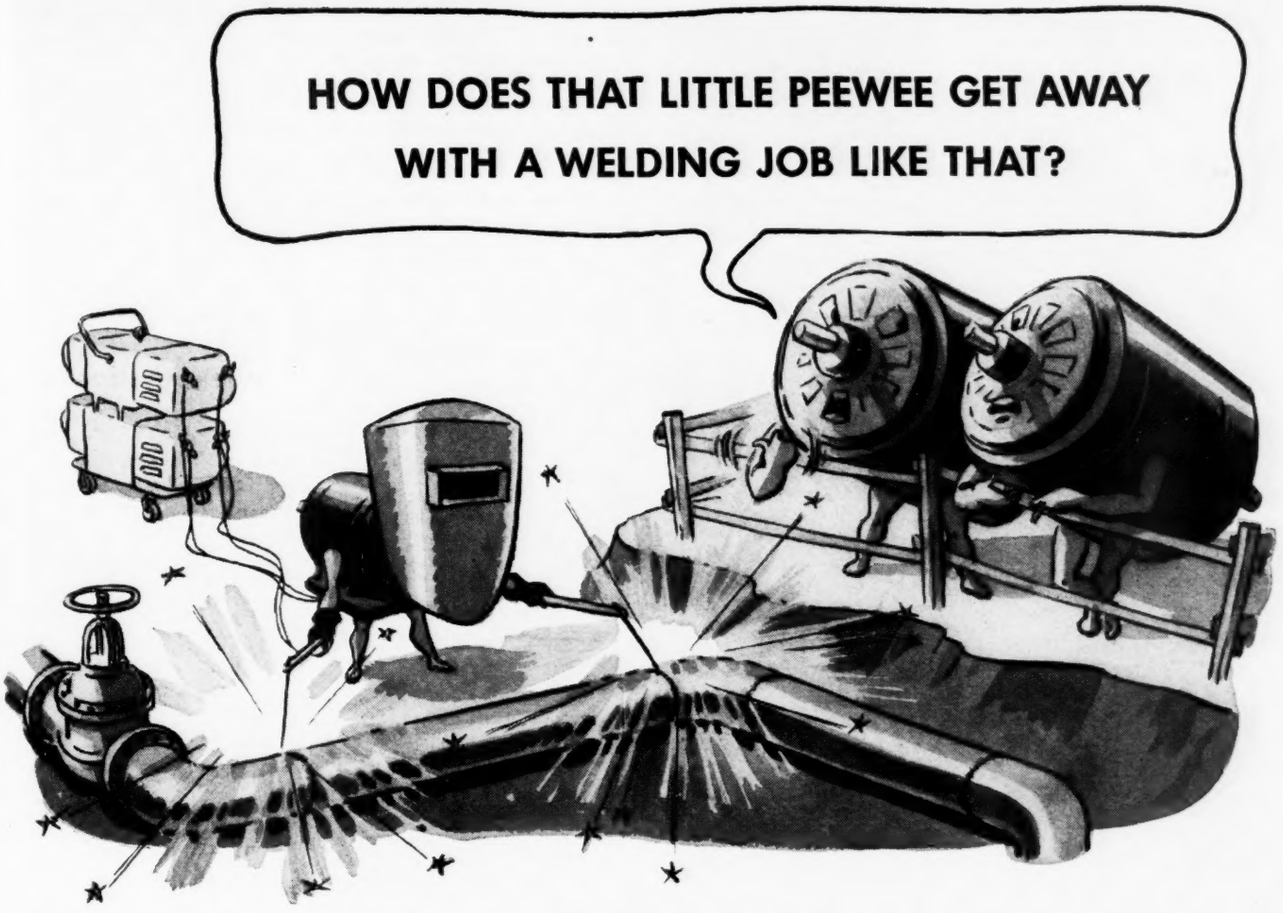
This small compressed-air outfit is handy for a great variety of odd jobs. It is easily portable and can be taken anywhere with little effort. Three types of mountings are available, all built around the same gasoline-engine-compressor plant.

The pushabout is mounted on roller-bearing pneumatic-tired wheels. It is well balanced and can be easily rolled on and off a truck. One man can handle it on the ground. A turtle-back cover protects the compressor and engine from the weather and provides a means of locking the wheels against theft.

•

CARBON BRUSH CONCAVER

It is said to be easy to form brushes correctly to the commutator curvature with a new device announced by the Ideal Commutator Dresser Co., Sycamore, Ill. The old brush is used as a template to locate accurately the arc segment on the cutting guide slot, which arc corresponds to the contour of the commutator or slip ring. After this segment



How Fiberglas* insulated generators solved a welding problem—and the moral for you

A MANUFACTURER of arc welders had developed a new model.

It was small, inexpensive, and so designed that two men could weld from the same unit at the same time. This meant two leads and of course a correspondingly larger output of current from the generator. But here was the hitch.

An ordinary cotton-insulated generator, large enough to deliver the output wanted, made the unit cost too high. A smaller generator brought the cost in line, but burned out when both leads were in use.

The problem was to find a smaller generator with a Class B insulation which was inexpensive to install . . . which would resist the high temperature developed at 3600 r.p.m.—the speed at which the generator ran to deliver the welding current needed.

The arc-welder manufacturer found such an insulation in Fiberglas. Used it on the magnet wires of the smaller generator. And of the scores in use today, *not one has failed*. Some of them work on 24-hour schedules.

This case history spotlights two mighty important superiorities of Fiberglas.

Here is superiority #1

Several important manufacturers are now making *smaller-size* Fiberglas-insulated motors and generators. And these still have a *substantially larger safety factor* than ordinary units insulated with Class A materials, even though they operate at approved higher temperatures. Their cost is a little more in some cases—often no more.

Or, by changing from Class A to Fiberglas insulation, you can get the *maximum safety factor* in *standard-size* motors and generators.

Now for superiority #2

If you have tough jobs around your plant, you get a highly superior "tough job" electrical insulation in Fiberglas. For Fiberglas resists heat, chemical vapors, moisture, and most types of process dust *better than ordinary electrical insulations.*

So, don't forget! Downtime costs money. Holds up defense production. And with machinery operating more hours at higher speeds, you can't afford to take the chance on breakdowns.

You need an increased safety factor! Specify Fiberglas Electrical Insulation. *Owens-Corning Fiberglas Corporation, Toledo, Ohio.* In Canada: *Fiberglas Canada Ltd., Oshawa, Ontario.*

OWENS-CORNING

FIBERGLAS*

*T. M. Reg. U. S. Pat. Off.

SPECIFY FIBERGLAS ELECTRICAL INSULATION

is found the new brushes may be formed without further set-up.

Any electric drill or electrical shaft drive may be used to operate the cutting head. The complete unit includes aluminum guide casting, cutting file, removable angle plate with clamping device and "C" clamp. Takes practically any size brush for 4- to 48-in. diameter commutator.

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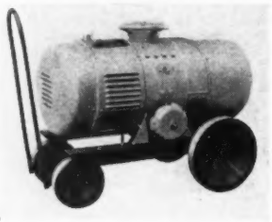
DUAL VOLTAGE SWITCH FOR ARC WELDERS

Wilson Welder & Metals Co., Inc., New York City, offers a new dual voltage switch for installation on arc-welding machines when they must be used on either of two line voltages at different times. The new device, known as the Type CH, can be used on any motor employing alternating current, provided the motor and starter are reconnectable for two voltages.



The new switch has two main parts: a base which is mounted directly on the machine and a removable top cover which is held in place by a center stud and nut. The cover has three equally spaced tabs which fit between bosses on the base. The top cover can be set on the base in either of two different positions—each corresponding to a line voltage.

Adaptation of the dual voltage switch to different line voltages is simple and fast. The center nut is loosened and the top cover is rotated until the desired line voltage figures are visible. No other adjustment is needed. The switch can then be locked into position for safety. The standard dual voltage switch is designed for 220-440 volts of a delta-connected motor. It reconnects the stator winding and also adjusts the holding coil of the magnetic starter and heater relays.

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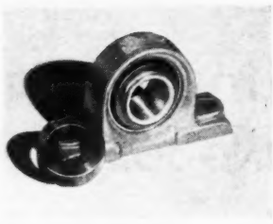
TRANSMISSION UNITS

Fafnir Bearing Co., New Britain, Conn., announces a new series of ball-bearing pillow blocks and other transmission units incorporating Fafnir "Mechani-Seal" ball bearings. The new streamlined light series pillow blocks, flange cartridges and cylindrical cartridges, according to the manufacturer, have two



outstanding advantages: in addition to the efficiency of the "Mechani-Seal" construction they offer ease of application made possible by wide inner ring design with self-locking collar. They are locked to the shaft with a finger twist; no machine, shaft shoulders, adapters or locknuts are required.

The "Mechani-Seal" bearing, employing close tolerances rather than rubbing material for its efficiency, imposes no friction or drag. Two steel plate shields form the innermost members. They are tightly fitted to the bearing outer ring. An outer corrosion-proofed steel plate shield, pressed on the inner ring, clears these inner plates by definite but close tolerances and acts as an efficient slinger.

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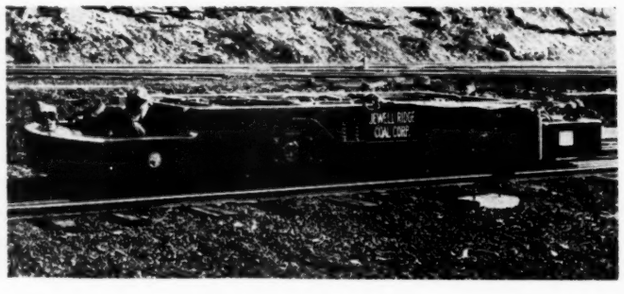
LOCOMOTIVE FITS MINE

It is now possible to buy a locomotive to fit the mine rather than to dig a mine to fit the locomotive, according to General Electric Co., Schenectady, N. Y., which has announced a 15-ton mine-haulage locomotive with an over-all height of only 26 in. The unit is able to operate in a 40-in. seam without brushing top or taking up bottom, as there is practically 8 in. clearance above the locomotive.

Over-all height has been held down by using high-speed body-mounted self-ventilated motors and double-reduction gear drives. The motors are connected to the gears through drive shafts with double universal and slip joints. There are a 10-stop controller, reverser, hand-brake wheel, air-raised trolley, air brake, air sander and whistle valve, and adequate space for motorman and trip-rider. Equalized spring suspension minimizes derailments, and overload devices protect the equipment under all conditions. The air reservoirs are contained in the two all-welded bumpers.

The two G.E.-1204 motors are the series-wound commutating-pole self-ventilated cylindrical-frame type with Class B insulation, each with a one-hour rating of 90 hp. and a continuous rating of 84 hp. at its pinion at 250 volts d.c. The armatures are carried on anti-friction bearings in separate frame heads. The motors are connected in parallel.

The control equipment includes a small master controller with a hand-operated reverser, air-operated contactors controlled by magnet valves (solenoid-operated contactors also may be furnished), and an overload relay. With a special type of trolley support on one side of the locomotive, the trolley base can be raised to a height which permits the pole to be swung across the top of the locomotive by merely operating an air valve. The pole can thus be set easily for trailing when the direction of travel is changed at the track terminals.



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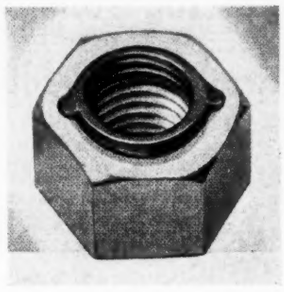
LOCKNUT

A locking nut that can be tightened up or backed off part way, years after its application, and still retain its grip on the bolt, is offered by Security Metal Products, Inc., Kalamazoo, Mich. According to the manufacturer, it can be taken off and reapplied



many times without losing its gripping power. The bolt-gripping element of this nut consists of a slightly elliptical-shaped spring-steel retainer permanently seated in the head of a standard nut.

When the nut is applied, the retainer is distorted from an elliptical into a circular shape, thus setting up a powerful spring pressure between the bolt threads and the retainer threads. Neither the threads of the bolt nor of the retainer are injured when applying or removing. The nut is started on the bolt with the fingers, just like a common nut, and a wrench is used when the threads of the retainer start to engage the threads on the bolt. It fully meets thread-pitch tolerances of the National Screw Thread commission.

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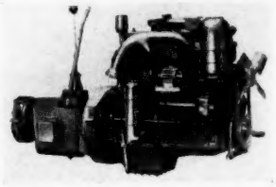
AUTOMOTIVE ENGINE

Caterpillar Tractor Co., Peoria, Ill., announces a four-cylinder 60-hp. automotive engine, the Model D312. It is a four-stroke valve-in-head water-cooled model with a bore of 4¼ in. and a stroke of 5½ in. Maximum horsepower is developed at 1,800 r.p.m. and maximum torque of 193 lb.-ft. at 1,200 r.p.m. Piston displacement is 312 cu.in. Pis-



tons are of aluminum alloy; the block, cylinder head and crankcase unit are in cast alloy iron. There are five main crankshaft bearings, with a total surface of 89.5 sq.in. Crankpin bearings are 2⅝ in. in diameter and 1⅞ in. long. There is a crankshaft torsional vibration damper.

Water circulation is by pump, with operating temperature of the water controlled by thermostat. An air-cooled-type lubricating oil cooler is provided. Pressure lubrication is provided to all main and crankpin bearings, camshaft bearings, valve operating mechanism and timing gears. The engine fuel system, manufactured by Caterpillar, features solid injection into precombustion chambers. There is an individual pump and valve for each cylinder; and the system is factory set, requiring no adjustment in the field.

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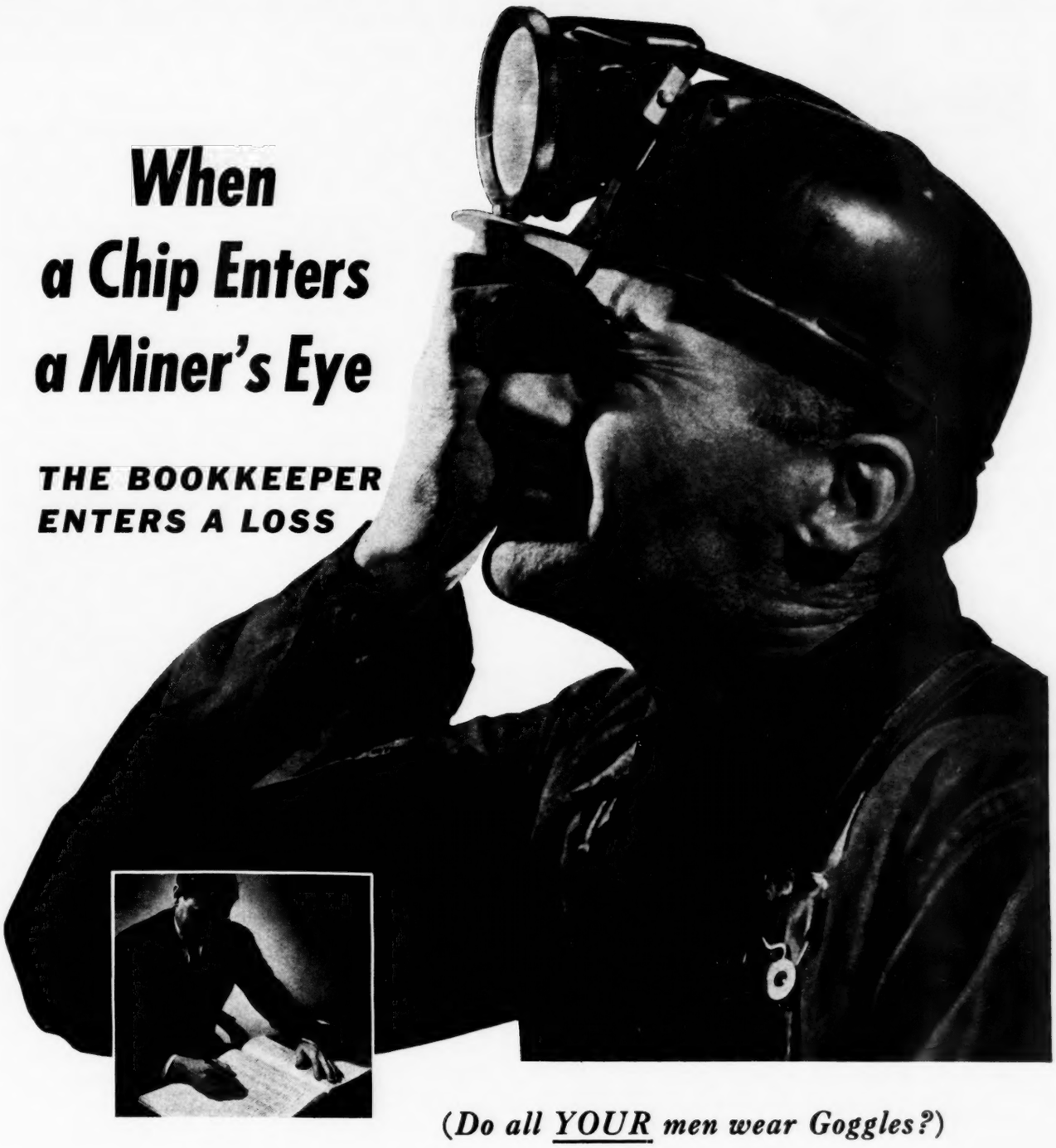
PUSHER LOCOMOTIVE

H. K. Porter Co., Inc., Pittsburgh, Pa., offers a 40-ton pusher locomotive. Designed for use on 42-in. narrow-gage track laid between two standard tracks, it is fitted with two pusher arms which, in operation, swing out behind freight cars on the regular tracks, pushing them along as the pusher locomotive moves ahead.

The new locomotive is powered

When a Chip Enters a Miner's Eye

THE BOOKKEEPER ENTERS A LOSS



(Do all YOUR men wear Goggles?)

One chip, cutting into an eye, can cut you out of your profit on untold tons of coal. And if miners' eyes go unguarded, you're bound to pay for it sooner or later .... as much as 1c to 5c added to your cost per ton.

Keep on the profitable end of selling coal .. and keep off the losing end of paying for damaged and extinguished eyes. *For you can't strike a balance between them.* But you *can* strike effectively at eye-losses, as other modern mines are doing. And to this end, your Mine Safety Appliances representative is always ready to help you. Start action *now* . . . arrange to have him demonstrate to your miners the *comfortable security* of American Goggles that are cool and easy on the face . . . and fitted with deep-curved, extra-strong Super Armorplate Lenses, clear or glare-proof Calobar (which can be ground to the individual prescriptions of all whose vision is defective).

American Optical Company

Factories Located at Southbridge, Massachusetts

REPRESENTED IN THE COAL MINING INDUSTRY BY MINE SAFETY APPLIANCES COMPANY, PITTSBURGH, PA.

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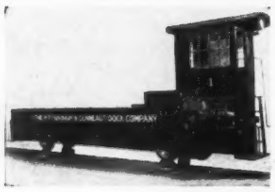

by two 100-hp. Westinghouse mill-type motors fitted with double-reduction gear drives and inclosed in cast-steel housings. Current is supplied by collector shoes on a third rail. For utmost efficiency, all shafts are mounted on anti-friction bearings, and motors are ventilated by filtered air being forced over them at the rate of 2,400 c.f.m. This latter operation is accomplished by means of an electrically operated conoidal fan.

Both brakes and pusher arms are operated by a 25-cu. ft. electrically driven air compressor. Brake bands are placed on drive shafts between motors and transmissions, a feature which is said to make for low wear on wheel flanges and consequent economies. Additional features are the electrically heated cab, floored with ebony asbestos wood for long wear and safe use, and electrically heated sand boxes. Size of the locomotive is 36 ft. long, 15 ft. high and 51 in. wide. It weighs 80,000 lb. and has a rated tractive force of 20,000 lb., with a maximum tractive force of 30,000 lb.

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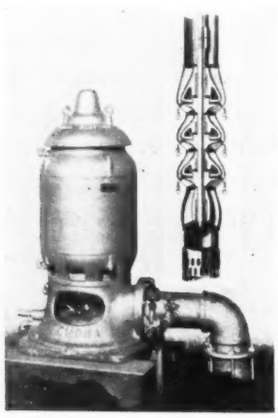
TURBINE PUMPS

Pomona Pump Co., Pomona, Calif., announces complete redesign of its line of 6-in. medium-capacity vertical turbine pumps. As a result of improved engineering practice, particularly in the newly designed impellers and seats, the manufacturer states that the new models afford higher efficiency and better performance, resulting in lower cost for the user. For a desired capacity of 100 g.p.m. against 110-ft. lift in a well and 50 lb. pressure above, a 7½-hp. motor is required, as against a 10-hp. motor with the old model. The efficiency of this particular size pump for this head capacity has been increased 6½ points and the number of stages has been reduced one-fourth.



Other advantages of these pumps, making for extremely low operating costs, says the manufacturer, are: they are water-lubricated, with no stuffing box below ground level; the specially designed semi-open impeller can be adjusted from the surface for wear and for changing capacity; and they are non-sandlocking and non-gaslocking. Constructed of high-quality bronze, the semi-open impellers operate in a cone-shaped seat in the pump bowls. Correct curvature of the impeller vanes is said to assure maximum lifting capacity and prevent overloading of motor regardless of changes in water level.

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AUTOMATIC SUBSTATION

A new and completely automatic switchgear equipment for controlling one or more a.c. synchronous converters in mining service is announced by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Although standard use on the

2,300-volt a.c. 60-cycle service, with 275-volt d.c. converter output, special adaptations may be had for other voltages. The complete switchgear represents a compact unit with a length of only about 8 ft. and consists of high-tension equipment, a.c. starting and running panel, relay panel, and a d.c. panel.

All relays, meters, circuit breakers and auxiliaries are surface mounted on ebony asbestos panels supported by a steel structure. Starting and stopping sequences are entirely automatic, and protection is continuously afforded throughout all points of the operating cycle against abnormal conditions. The d.c. converter breaker may be used as a feeder breaker; thus overcurrent protection is incorporated in the control; automatic reclosing is available when this breaker is used for this purpose.

A new and completely self-contained alternating-current generating unit which regulates, controls, and meters its output also is offered by Westinghouse. Called the "Simpac" power unit, it combines a standard open-type a.c. generator, a d.c. exciter, exciter field rheostat, voltmeter, ammeter, and optional voltage regulator in one integral unit. The "Simpac" was designed especially to fill the need for a completely self-contained generating unit for use in out-of-the-way localities, or for special requirements in industrial plants. It may be either engine- or electric-motor-driven, direct or belt connected.

Voltage is adjusted manually by the exciter field rheostat, the voltmeter being in plain sight of the operator. Generators employed have an inherent voltage regulation of 10 per cent at 80 per cent power factor. Should this not be sufficient, the voltage variation may be improved to as low as 1½ per cent by use of a "Silverstat" automatic resistance-type regulator.

Ratings from 3.75 to 187 kva. are available in voltages of 120/208, 240 or 480, with operating speeds from 600 to 1,800 r.p.m. All come wired and assembled.

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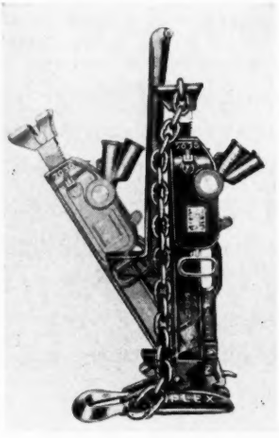
HEAVY-DUTY JACK

An emergency jack for use in the heavy industries is offered by Templeton, Kenly & Co., Chicago, in a model having a full 20-ton lifting and holding capacity on either the cap or toe lift. Designated as No. 2030, this unit is 30 in. high, has a full 17¾-in. lift and weighs 167 lb. with complete equipment.

It also lifts on the auxiliary shoe which hooks into the cap or on the chain with grab hook end, any link of which can be engaged with the recess in the cap. Besides lifting and lowering vertically the jack tilts on its base for jacking at an angle.



The tilting pawl can be released by the operator's toe. It also can be used horizontally for pushing, spreading or pulling by using the chain.

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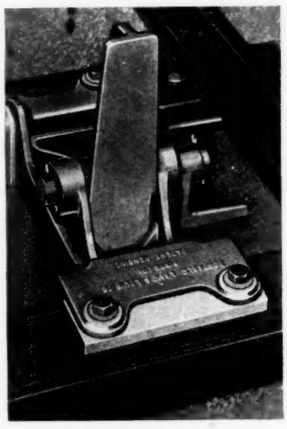
AUTOMATIC CAR HOLDER

Portable Lamp & Equipment Co., Pittsburgh, Pa., offers an automatic car holder designed chiefly to increase safety and efficiency in gathering trips. It consists of a base casting, for securing it to ties, a holding member, and a counterweight which controls position of the holding member.

In use, the holding member is placed in a vertical position and the car is pushed against it, causing it to fall horizontal and allowing the car to pass over it.



After the car has passed, the counterweight causes holding member to return to vertical, thus holding the car. This process is repeated for every car until the entire trip is gathered. The new holder is strongly constructed, easily installed and removed by means of standard track bolts.

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STORAGE BATTERY FOR FLASHLIGHTS

A rechargeable flashlight battery similar in principle to the automobile storage battery is offered by the Ideal Commutator Dresser Co., Sycamore, Ill. An ingeniously arranged chamber and vent plus semi-fixation of the electrolyte, says the manufacturer, makes it spillproof. The plates are over ¼ in. thick and connected to terminals by reinforced electrodes so that the battery will stand rough handling. The case is of transparent Lucite. All batteries are use-conditioned at the factory.

A small charger consisting of transformer and rectifier plates makes it easy to keep the battery always fully charged. Merely plug into convenient 110-volt 60-cycle wall socket.